



NuCycle-0021.ST25.txt
SEQUENCE LISTING

<110> Fedorkin, et al.,
<120> System for Expression of Genes in Plants
<130> 2002645-0021
<140> 10/770,600
<141> 2004-02-03
<160> 53
<170> PatentIn version 3.2
<210> 1
<211> 28
<212> DNA
<213> Artificial
<220>
<223> Primer SR22 was used to clone hGH without its leader, and
introducing a PacI site at the 5' end.
<400> 1
ccgttaatta atgttcccaa ctattcca 28

<210> 2
<211> 25
<212> DNA
<213> Artificial
<220>
<223> Primer SR23 was used to clone hGH with its leader.
<400> 2
ttaattaatg gcaactggat caagg 25

<210> 3
<211> 24
<212> DNA
<213> Artificial
<220>
<223> Primer SR24 was used to clone the hGH gene without KDEL and
introducing a XhoI site at the 3' end.
<400> 3
cggctcgagt taaaaaccac atga 24

<210> 4
<211> 30
<212> DNA
<213> Artificial
<220>
<223> Primer SR25 was used to clone the gene with KDEL.
<400> 4
cggctcgagt tcattctttaa aacctgatcc 30

NuCycle-0021.ST25.txt

<210> 5
<211> 42
<212> DNA
<213> Artificial

<220>
<223> Xho1 site at 3' end of A peptide with KDEL.

<400> 5
cggctcgagt cagagttcat ctttgttaca gtagttctca ag 42

<210> 6
<211> 36
<212> DNA
<213> Artificial

<220>
<223> Primer used to modify GFP from Aequorea Victoria.

<400> 6
gggagatctt aattaatggc tagcaaagga gaagaa 36

<210> 7
<211> 45
<212> DNA
<213> Artificial

<220>
<223> Primer used to modify GFP from Aequorea Victoria.

<400> 7
cccctcgagc ggccgctgca gttatttgta gagctcatcc atgcc 45

<210> 8
<211> 23
<212> DNA
<213> Artificial

<220>
<223> Primer used to modify GFP from Aequorea Victoria.

<400> 8
gttccctggc caacacttgt cac 23

<210> 9
<211> 22
<212> DNA
<213> Artificial

<220>
<223> Primer used to modify GFP from Aequorea Victoria.

<400> 9
tagtgacaag tgttggccag gg 22

<210> 10

NuCycle-0021.ST25.txt

<211> 25
 <212> DNA
 <213> Artificial

<220>
 <223> Primer used to modify GFP from Aequorea Victoria.

<400> 10
 ggacacaaac tggagtacaa ctata 25

<210> 11
 <211> 25
 <212> DNA
 <213> Artificial

<220>
 <223> Primer used to modify GFP from Aequorea Victoria.

<400> 11
 agttatagtt gtactccagt ttgtg 25

<210> 12
 <211> 33
 <212> DNA
 <213> Artificial

<220>
 <223> Primer related to Alfalfa Mosaic virus

<400> 12
 ccgctcgagc tgcagtgtag cccattaatt tgg 33

<210> 13
 <211> 35
 <212> DNA
 <213> Artificial

<220>
 <223> Primer related to Alfalfa mosaic virus.

<400> 13
 cgggtcgagc cggccgcgaa taggacttca tacct 35

<210> 14
 <211> 35
 <212> DNA
 <213> Artificial

<220>
 <223> Primer related to Alfalfa mosaic virus.

<400> 14
 cgggtcgagc cggccgcaat atgaagtcga tccta 35

<210> 15
 <211> 35
 <212> DNA
 <213> Artificial

NuCycle-0021.ST25.txt

<220>

<223> Primer related to Alfalfa mosaic virus.

<400> 15

cgggtcgcgcg cggccgcgca tcccttaggg gcatt

35

<210> 16

<211> 424

<212> PRT

<213> Tobamovirus/TMV-KR

<400> 16

Lys Gln Met Ser Ser Ile Val Tyr Thr Gly Pro Ile Lys Val Gln Gln
1 5 10 15

Met Lys Asn Phe Ile Asp Ser Leu Val Ala Ser Leu Ser Ala Ala Val
20 25 30

Ser Asn Leu Val Lys Ile Leu Lys Asp Thr Ala Ala Ile Asp Leu Glu
35 40 45

Thr Arg Gln Lys Phe Gly Val Leu Asp Val Ala Ser Arg Lys Trp Leu
50 55 60

Ile Lys Pro Thr Ala Lys Ser His Ala Trp Gly Val Val Glu Thr His
65 70 75 80

Ala Arg Lys Tyr His Val Ala Leu Leu Glu Tyr Asp Glu Gln Gly Val
85 90 95

Val Thr Cys Asp Asn Trp Arg Arg Val Ala Val Ser Ser Glu Ser Val
100 105 110

Val Tyr Ser Asp Met Ala Lys Leu Arg Thr Leu Arg Arg Leu Leu Arg
115 120 125

Asn Gly Glu Pro His Val Ser Ser Ala Lys Val Val Leu Val Asp Gly
130 135 140

Val Pro Gly Cys Gly Lys Thr Lys Glu Ile Leu Ser Arg Val Asn Phe
145 150 155 160

Asp Glu Asp Leu Ile Leu Val Pro Gly Lys Gln Ala Ala Glu Met Ile
165 170 175

Arg Arg Arg Ala Asn Ser Ser Gly Ile Ile Val Ala Thr Lys Asp Asn
180 185 190

NuCycle-0021.ST25.txt

Val Lys Thr Val Asp Ser Phe Met Met Asn Phe Gly Lys Ser Thr Arg
195 200 205

Cys Gln Phe Lys Arg Leu Phe Ile Asp Glu Gly Leu Met Leu His Thr
210 215 220

Gly Cys Val Asn Phe Leu Val Thr Met Ser Leu Cys Glu Ile Ala Tyr
225 230 235 240

Val Tyr Gly Asp Thr Gln Gln Ile Pro Tyr Ile Asn Arg Val Ser Gly
245 250 255

Phe Pro Tyr Pro Ala His Phe Ala Lys Leu Glu Val Asp Glu Val Glu
260 265 270

Thr Arg Arg Thr Thr Leu Arg Cys Pro Ala Asp Val Thr His Tyr Leu
275 280 285

Asn Arg Arg Tyr Glu Gly Phe Val Met Ser Thr Ser Ser Val Lys Lys
290 295 300

Ser Val Ser Gln Glu Met Val Gly Gly Ala Ala Val Ile Asn Pro Ile
305 310 315 320

Ser Lys Pro Leu His Gly Lys Ile Leu Thr Phe Thr Gln Ser Asp Lys
325 330 335

Glu Ala Leu Leu Ser Arg Gly Tyr Ser Asp Val His Thr Val His Glu
340 345 350

Val Gln Gly Glu Thr Tyr Ser Asp Val Ser Leu Val Arg Leu Thr Pro
355 360 365

Thr Pro Val Ser Ile Ile Ala Gly Asp Ser Pro His Val Leu Val Ala
370 375 380

Leu Ser Arg His Thr Cys Ser Leu Lys Tyr Tyr Thr Val Val Met Asp
385 390 395 400

Pro Leu Val Ser Ile Ile Arg Asp Leu Glu Lys Leu Ser Ser Tyr Leu
405 410 415

Leu Asp Met Tyr Lys Val Asp Ala
420

<210> 17
<211> 424
<212> PRT

<213> Tobamovirus/TMV-RAK

<400> 17

Lys Gln Met Ser Ser Ile Val Tyr Thr Gly Pro Ile Lys Val Gln Gln
 1 5 10 15

Met Lys Asn Phe Ile Asp Ser Leu Val Ala Ser Leu Ser Ala Ala Val
 20 25 30

Ser Asn Leu Val Lys Ile Leu Lys Asp Thr Ala Ala Ile Asp Leu Glu
 35 40 45

Thr Arg Gln Lys Phe Gly Val Leu Asp Val Ala Ser Arg Lys Trp Leu
 50 55 60

Ile Lys Pro Thr Ala Lys Ser His Ala Trp Gly Val Val Glu Thr His
 65 70 75 80

Ala Arg Lys Tyr His Val Ala Leu Leu Glu Tyr Asp Glu Gln Gly Ile
 85 90 95

Val Thr Cys Asp Asp Trp Arg Arg Val Ala Val Ser Ser Glu Ser Val
 100 105 110

Val Tyr Ser Asp Met Ala Lys Leu Arg Thr Leu Arg Arg Leu Leu Arg
 115 120 125

Asp Gly Glu Pro His Val Ser Asn Ala Lys Val Val Leu Val Asp Gly
 130 135 140

Val Pro Gly Cys Gly Lys Thr Lys Glu Ile Leu Ser Arg Val Asn Phe
 145 150 155 160

Asp Glu Asp Leu Ile Leu Val Pro Gly Lys Gln Ala Ala Glu Met Ile
 165 170 175

Arg Arg Arg Ala Asn Ser Ser Gly Ile Ile Val Ala Thr Lys Asp Asn
 180 185 190

Val Arg Thr Val Asp Ser Phe Met Met Asn Phe Gly Lys Thr Thr Arg
 195 200 205

Cys Gln Phe Lys Arg Leu Phe Ile Asp Glu Gly Leu Met Leu His Thr
 210 215 220

Gly Cys Val Asn Phe Leu Val Ala Met Ser Leu Cys Asp Val Ala Tyr
 225 230 235 240

NuCycle-0021.ST25.txt

Val Tyr Gly Asp Thr Gln Gln Ile Pro Tyr Ile Asn Arg Val Ser Gly
245 250 255

Phe Pro Tyr Pro Ala His Phe Ser Lys Leu Glu Val Asp Glu Val Glu
260 265 270

Thr Arg Arg Thr Thr Leu Arg Cys Pro Ala Asp Val Thr His Tyr Leu
275 280 285

Asn Arg Arg Tyr Glu Gly Phe Val Val Ser Thr Ser Ser Val Lys Lys
290 295 300

Ser Val Ser Gln Glu Met Val Ser Gly Ala Ala Val Ile Asn Pro Ile
305 310 315 320

Ser Lys Pro Leu His Gly Lys Ile Leu Thr Phe Thr Gln Ser Asp Lys
325 330 335

Glu Ala Leu Leu Ser Arg Gly Tyr Ser Glu Val His Thr Val His Glu
340 345 350

Val Gln Gly Glu Thr Tyr Ser Asp Val Ser Leu Val Arg Leu Thr Pro
355 360 365

Thr Pro Ile Ser Ile Ile Ala Gly Asp Ser Pro His Val Leu Val Ala
370 375 380

Leu Ser Arg His Thr Cys Ser Leu Lys Tyr Tyr Thr Val Val Met Asp
385 390 400

Pro Leu Val Ser Ile Ile Arg Asp Leu Glu Lys Leu Ser Ser Tyr Leu
405 410 415

Leu Asp Met Tyr Lys Val Asp Ala
420

<210> 18
<211> 424
<212> PRT
<213> Tobamovirus/TMV-vul

<400> 18

Lys Gln Met Ser Ser Ile Val Tyr Thr Gly Pro Ile Lys Val Gln Gln
1 5 10 15

Met Lys Asn Phe Ile Asp Ser Leu Val Ala Ser Leu Ser Ala Ala Val
20 25 30

NuCycle-0021.ST25.txt

Ser Asn Leu Val Lys Ile Leu Lys Asp Thr Ala Ala Ile Asp Leu Glu
35 40 45

Thr Arg Gln Lys Phe Gly Val Leu Asp Val Ala Ser Arg Lys Trp Leu
50 55 60

Ile Lys Pro Thr Ala Lys Ser His Ala Trp Gly Val Val Glu Thr His
65 70 75 80

Ala Arg Lys Tyr His Val Ala Leu Leu Glu Tyr Asp Glu Gln Gly Val
85 90 95

Val Thr Cys Asp Asp Trp Arg Arg Val Ala Val Ser Ser Glu Ser Val
100 105 110

Val Tyr Ser Asp Met Ala Lys Leu Arg Thr Leu Arg Arg Leu Leu Arg
115 120 125

Asn Gly Glu Pro His Val Ser Ser Ala Lys Val Val Leu Val Asp Gly
130 135 140

Val Pro Gly Cys Gly Lys Thr Lys Glu Ile Leu Ser Arg Val Asn Phe
145 150 155 160

Asp Glu Asp Leu Ile Leu Val Pro Gly Lys Gln Ala Ala Glu Met Ile
165 170 175

Arg Arg Arg Ala Asn Ser Ser Gly Ile Ile Val Ala Thr Lys Asp Asn
180 185 190

Val Lys Thr Val Asp Ser Phe Met Met Asn Phe Gly Lys Ser Thr Arg
195 200 205

Cys Gln Phe Lys Arg Leu Phe Ile Asp Glu Gly Leu Met Leu His Thr
210 215 220

Gly Cys Val Asn Phe Leu Val Ala Met Ser Leu Cys Glu Ile Ala Tyr
225 230 235 240

Val Tyr Gly Asp Thr Gln Gln Ile Pro Tyr Ile Asn Arg Val Ser Gly
245 250 255

Phe Pro Tyr Pro Ala His Phe Ala Lys Leu Glu Val Asp Glu Val Glu
260 265 270

Thr Arg Arg Thr Thr Leu Arg Cys Pro Ala Asp Val Thr His Tyr Leu
275 280 285

NuCycle-0021.ST25.txt

Asn Arg Arg Tyr Glu Gly Phe Val Met Ser Thr Ser Ser Val Lys Lys
 290 295 300
 Ser Val Ser Gln Glu Met Val Gly Gly Ala Ala Val Ile Asn Pro Ile
 305 310 315
 Ser Lys Pro Leu His Gly Lys Ile Leu Thr Phe Thr Gln Ser Asp Lys
 325 330 335
 Glu Ala Leu Leu Ser Arg Gly Tyr Ser Asp Val His Thr Val His Glu
 340 345 350
 Val Gln Gly Glu Thr Tyr Ser Asp Val Ser Leu Val Arg Leu Thr Pro
 355 360 365
 Thr Pro Val Ser Ile Ile Ala Gly Asp Ser Pro His Val Leu Val Ala
 370 375 380
 Leu Ser Arg His Thr Cys Ser Leu Lys Tyr Tyr Thr Val Val Met Asp
 385 390 395 400
 Pro Leu Val Ser Ile Ile Arg Asp Leu Glu Lys Leu Ser Ser Tyr Leu
 405 410 415
 Leu Asp Met Tyr Lys Val Asp Ala
 420

<210> 19
 <211> 424
 <212> PRT
 <213> Tobamovirus/TOMV

<400> 19

Lys Gln Met Cys Ser Ile Val Tyr Thr Gly Pro Leu Lys Val Gln Gln
 1 5 10 15
 Met Lys Asn Phe Ile Asp Ser Leu Val Ala Ser Leu Ser Ala Ala Val
 20 25 30
 Ser Asn Leu Val Lys Ile Leu Lys Asp Thr Ala Ala Ile Asp Leu Glu
 35 40 45
 Thr Arg Gln Lys Phe Gly Val Leu Asp Val Ala Ser Lys Arg Trp Leu
 50 55 60
 Val Lys Pro Ser Ala Lys Asn His Ala Trp Gly Val Val Glu Thr His
 65 70 75 80

NuCycle-0021.ST25.txt

Ala Arg Lys Tyr His Val Ala Leu Leu Glu His Asp Glu Phe Gly Ile
85 90 95

Ile Thr Cys Asp Asn Trp Arg Arg Val Ala Val Ser Ser Glu Ser Val
100 105 110

Val Tyr Ser Asp Met Ala Lys Leu Arg Thr Leu Arg Arg Leu Leu Lys
115 120 125

Asp Gly Glu Pro His Val Ser Ser Ala Lys Val Val Leu Val Asp Gly
130 135 140

Val Pro Gly Cys Gly Lys Thr Lys Glu Ile Leu Ser Arg Val Asn Phe
145 150 155 160

Glu Glu Asp Leu Ile Leu Val Pro Gly Arg Gln Ala Ala Glu Met Ile
165 170 175

Arg Arg Arg Ala Asn Ala Ser Gly Ile Ile Val Ala Thr Lys Asp Asn
180 185 190

Val Arg Thr Val Asp Ser Phe Leu Met Asn Tyr Gly Lys Gly Ala Arg
195 200 205

Cys Gln Phe Lys Arg Leu Phe Ile Asp Glu Gly Leu Met Leu His Thr
210 215 220

Gly Cys Val Asn Phe Leu Val Glu Met Ser Leu Cys Asp Ile Ala Tyr
225 230 235 240

Val Tyr Gly Asp Thr Gln Gln Ile Pro Tyr Ile Asn Arg Val Thr Gly
245 250 255

Phe Pro Tyr Pro Ala His Phe Ala Lys Leu Glu Val Asp Glu Val Glu
260 265 270

Thr Arg Arg Thr Thr Leu Arg Cys Pro Ala Asp Val Thr His Phe Leu
275 280 285

Asn Gln Arg Tyr Glu Gly His Val Met Cys Thr Ser Ser Glu Lys Lys
290 295 300

Ser Val Ser Gln Glu Met Val Ser Gly Ala Ala Ser Ile Asn Pro Val
305 310 315 320

Ser Lys Pro Leu Lys Gly Lys Ile Leu Thr Phe Thr Gln Ser Asp Lys

325

335

Glu Ala Leu Leu Ser Arg Gly Tyr Ala Asp Val His Thr Val His Glu
340 345 350

Val Gln Gly Glu Thr Tyr Ala Asp Val Ser Leu Val Arg Leu Thr Pro
355 360 365

Thr Pro Val Ser Ile Ile Ala Arg Asp Ser Pro His Val Leu Val Ser
370 375 380

Leu Ser Arg His Thr Lys Ser Leu Lys Tyr Tyr Thr Val Val Met Asp
385 390 395 400

Pro Leu Val Ser Ile Ile Arg Asp Leu Glu Arg Val Ser Ser Tyr Leu
405 410 415

Leu Asp Met Tyr Lys Val Asp Ala
420

<210> 20
<211> 423
<212> PRT
<213> Tobamovirus/PMMV
<400> 20

Lys Gln Met His Ala Met Val Tyr Thr Gly Pro Leu Lys Val Gln Gln
1 5 10 15

Cys Lys Asn Tyr Leu Asp Ser Leu Val Ala Ser Leu Ser Ala Ala Val
20 25 30

Ser Asn Leu Lys Lys Ile Ile Lys Asp Thr Ala Ala Ile Asp Leu Glu
35 40 45

Thr Lys Glu Lys Phe Gly Val Tyr Asp Val Cys Leu Lys Lys Trp Leu
50 55 60

Val Lys Pro Leu Ser Lys Gly His Ala Trp Gly Val Val Met Asp Ser
65 70 75 80

Asp Tyr Lys Cys Phe Val Ala Leu Leu Thr Tyr Asp Gly Glu Asn Ile
85 90 95

Val Cys Gly Glu Thr Trp Arg Arg Val Ala Val Ser Ser Glu Ser Leu
100 105 110

Val Tyr Ser Asp Met Gly Lys Ile Arg Ala Ile Arg Ser Val Leu Lys
Page 11

115

120

125

Asp Gly Glu Pro His Ile Ser Ser Ala Lys Val Thr Leu Val Asp Gly
 130 135 140
 Val Pro Gly Cys Gly Lys Thr Lys Glu Ile Leu Ser Arg Val Asn Phe
 145 150 155 160
 Asp Glu Asp Leu Val Leu Val Pro Gly Lys Gln Ala Ala Glu Met Ile
 165 170 175
 Arg Arg Arg Ala Asn Ser Ser Gly Leu Ile Val Ala Thr Lys Glu Asn
 180 185 190
 Val Arg Thr Val Asp Ser Phe Leu Met Asn Tyr Gly Arg Gly Pro Cys
 195 200 205
 Gln Tyr Lys Arg Leu Phe Leu Asp Glu Gly Leu Met Leu His Pro Gly
 210 215 220
 Cys Val Asn Phe Leu Val Gly Met Ser Leu Cys Ser Glu Ala Phe Val
 225 230 235 240
 Tyr Gly Asp Thr Gln Gln Ile Pro Tyr Ile Asn Arg Val Ala Thr Phe
 245 250 255
 Pro Tyr Pro Lys His Leu Ser Gln Leu Glu Val Asp Ala Val Glu Thr
 260 265 270
 Arg Arg Thr Thr Leu Arg Cys Pro Ala Asp Ile Thr Phe Phe Leu Asn
 275 280 285
 Gln Lys Tyr Glu Gly Gln Val Met Cys Thr Ser Ser Val Thr Arg Ser
 290 295 300
 Val Ser His Glu Val Ile Gln Gly Ala Ala Val Met Asn Pro Val Ser
 305 310 315 320
 Lys Pro Leu Lys Gly Lys Val Ile Thr Phe Thr Gln Ser Asp Lys Ser
 325 330 335
 Leu Leu Leu Ser Arg Gly Tyr Glu Asp Val His Thr Val His Glu Val
 340 345 350
 Gln Gly Glu Thr Phe Glu Asp Val Ser Leu Val Arg Leu Thr Pro Thr
 355 360 365

NuCycle-0021.ST25.txt

Pro Val Gly Ile Ile Ser Lys Gln Ser Pro His Leu Leu Val Ser Leu
370 375 380

Ser Arg His Thr Arg Ser Ile Lys Tyr Tyr Thr Val Val Leu Asp Ala
385 390 395 400

Val Val Ser Val Leu Arg Asp Leu Glu Cys Val Ser Ser Tyr Leu Leu
405 410 415

Asp Met Tyr Lys Val Asp Val
420

<210> 21

<211> 421

<212> PRT

<213> Tobamovirus/TMGV

<400> 21

Lys Gln Met Ala Ser Val Val Tyr Thr Gly Ser Leu Lys Val Gln Gln
1 5 10 15

Met Lys Asn Tyr Val Asp Ser Leu Ala Ala Ser Leu Ser Ala Thr Val
20 25 30

Ser Asn Leu Cys Lys Ser Leu Lys Asp Glu Val Gly Tyr Asp Ser Asp
35 40 45

Ser Arg Glu Lys Val Gly Val Trp Asp Val Thr Leu Lys Lys Trp Leu
50 55 60

Leu Lys Pro Ala Ala Lys Gly His Ser Trp Gly Val Val Leu Asp Tyr
65 70 75 80

Lys Gly Lys Met Phe Thr Ala Leu Leu Ser Tyr Glu Gly Asp Arg Met
85 90 95

Val Thr Glu Ser Asp Trp Arg Arg Val Ala Val Ser Ser Asp Thr Met
100 105 110

Val Tyr Ser Asp Ile Ala Lys Leu Gln Asn Leu Arg Lys Thr Met Arg
115 120 125

Asp Gly Glu Pro His Glu Pro Thr Ala Lys Met Val Leu Val Asp Gly
130 135 140

Val Pro Gly Cys Gly Lys Tyr Lys Gly Asp Phe Glu Arg Phe Asp Leu
145 150 155 160

NuCycle-0021.ST25.txt

Asp Glu Asp Leu Ile Leu Val Pro Gly Lys Gln Ala Ala Ala Met Ile
 165 170 175
 Arg Arg Arg Ala Asn Ser Ser Gly Leu Ile Arg Ala Thr Met Asp Asn
 180 185 190
 Val Arg Thr Val Asp Ser Leu Leu Met His Pro Lys Pro Arg Ser His
 195 200 205
 Lys Arg Leu Phe Ile Asp Glu Gly Leu Met Leu His Thr Gly Cys Val
 210 215 220
 Asn Phe Leu Val Leu Ile Ser Gly Cys Asp Ile Ala Tyr Ile Tyr Gly
 225 230 235 240
 Asp Thr Gln Gln Ile Pro Phe Ile Asn Arg Val Gln Asn Phe Pro Tyr
 245 250 255
 Pro Lys His Phe Glu Lys Leu Gln Val Asp Glu Val Glu Met Arg Arg
 260 265 270
 Thr Thr Leu Arg Cys Pro Gly Asp Val Asn Phe Phe Leu Gln Ser Lys
 275 280 285
 Tyr Glu Gly Ala Val Thr Thr Thr Ser Thr Val Gln Arg Ser Val Ser
 290 295 300
 Ser Glu Met Ile Gly Gly Lys Gly Val Leu Asn Ser Val Ser Lys Pro
 305 310 315 320
 Leu Lys Gly Lys Ile Val Thr Phe Thr Gln Ala Asp Lys Phe Glu Leu
 325 330 335
 Glu Glu Lys Gly Tyr Lys Asn Val Asn Thr Val His Glu Ile Gln Gly
 340 345 350
 Glu Thr Phe Glu Asp Val Ser Leu Val Arg Leu Thr Ala Thr Pro Leu
 355 360 365
 Thr Leu Ile Ser Lys Ser Ser Pro His Val Leu Val Ala Leu Thr Arg
 370 375 380
 His Thr Lys Ser Phe Lys Tyr Tyr Thr Val Val Leu Asp Pro Leu Val
 385 390 395 400
 Gln Ile Ile Ser Asp Leu Ser Ser Leu Ser Ser Phe Leu Leu Glu Met
 405 410 415

NuCycle-0021.ST25.txt

Tyr Met Val Glu Ala
420

<210> 22
<211> 424
<212> PRT
<213> Tobamovirus/TMV-OB

<400> 22

Asn Lys Met Ala Ser Ile Val Tyr Ser Gly Pro Leu Gln Val Gln Gln
1 5 10 15

Met Gln Asn Tyr Val Asp Ser Leu Ala Ala Ser Leu Ser Ala Thr Val
20 25 30

Ser Asn Leu Lys Lys Leu Val Lys Asp Ser Ser Val Gly Phe Gln Asp
35 40 45

Ser Leu Ser Lys Val Gly Val Phe Asp Val Arg Lys Lys Met Trp Leu
50 55 60

Ile Lys Pro Thr Leu Lys Asn His Ser Trp Gly Val Val Gln Lys Phe
65 70 75 80

Asp Gly Lys Cys Phe Leu Ala Leu Leu Ser Tyr His Asn Glu Leu Pro
85 90 95

Ile Cys Asp Ala Asp Trp Ser Lys Val Ala Val Ser Asn Glu Ser Met
100 105 110

Val Tyr Ser Asp Met Ala Lys Leu Arg Val Leu Arg Lys Ser Ile Gly
115 120 125

Glu Met Pro Ile Ser Val Ser Ser Ala Lys Val Thr Leu Val Asp Gly
130 135 140

Val Pro Gly Cys Gly Lys Thr Lys Glu Ile Leu Arg Arg Val Asn Phe
145 150 155 160

Ser Glu Asp Leu Val Leu Val Pro Gly Lys Glu Ala Ala Ala Met Ile
165 170 175

Arg Lys Arg Ala Asn Gln Ser Gly Asn Ile Val Ala Asn Asn Asp Asn
180 185 190

Val Lys Thr Val Asp Ser Phe Leu Met Asn Leu Gly Lys Gly Pro Val
195 200 205

NuCycle-0021.ST25.txt

Cys Gln Phe Lys Arg Leu Phe Val Asp Glu Gly Leu Met Leu His Pro
210 215 220

Gly Cys Val Tyr Phe Leu Val Lys Leu Ser Leu Cys Asn Glu Ala Phe
225 230 235 240

Val Phe Gly Asp Thr Gln Gln Ile Pro Tyr Ile Asn Arg Val Gln Asn
245 250 255

Phe Pro Phe Pro Gln His Phe Ser Lys Leu Ile Val Asp Glu Thr Glu
260 265 270

Lys Arg Arg Thr Thr Leu Arg Cys Pro Val Asp Val Thr His Phe Leu
275 280 285

Asn Gln Cys Tyr Asp Gly Ala Val Thr Thr Thr Ser Lys Thr Gln Arg
290 295 300

Ser Val Gly Leu Glu Val Val Gly Gly Ala Ala Val Met Asn Pro Val
305 310 315 320

Thr Lys Pro Leu Lys Gly Lys Ile Val Thr Phe Thr Gln Ser Asp Lys
325 330 335

Leu Thr Met Leu Ser Arg Gly Tyr Gln Asp Val Asn Thr Val His Glu
340 345 350

Ile Gln Gly Glu Thr Tyr Glu Glu Val Ser Leu Val Arg Leu Thr Pro
355 360 365

Thr Pro Ile His Ile Ile Ser Arg Glu Ser Pro His Val Leu Val Gly
370 375 380

Leu Thr Arg His Thr Arg Cys Phe Lys Tyr Tyr Thr Val Val Leu Asp
385 390 395 400

Pro Leu Val Lys Leu Val Arg Asp Leu Glu Cys Val Ser Asn Phe Leu
405 410 415

Leu Asp Val Tyr Met Val Asp Ser
420

<210> 23
<211> 426
<212> PRT
<213> Tobamovirus/ORSV

<400> 23

NuCycle-0021.ST25.txt

Lys Ser Met Ser Ser Ala Val Tyr Thr Gly Pro Leu Lys Val Gln Gln
 1 5 10 15
 Met Lys Asn Tyr Met Asp Tyr Leu Ser Ala Ser Ile Ser Ala Thr Val
 20 25 30
 Ser Asn Leu Cys Lys Val Leu Lys Asp Val Tyr Gly Val Asp Pro Glu
 35 40 45
 Ser Ala Glu Lys Ser Gly Val Tyr Asp Val Val Lys Gly Lys Trp Ile
 50 55 60
 Ile Lys Pro Lys Asp Lys Cys His Ala Trp Gly Val Ala Asp Leu Asn
 65 70 75 80
 Asn Gly Glu Lys Val Ile Val Leu Leu Glu Trp Ala Asp Gly Phe Pro
 85 90 95
 Ile Cys Gly Asp Trp Arg Arg Val Ala Val Ser Ser Asp Ser Leu Ile
 100 105 110
 Tyr Ser Asp Met Gly Lys Leu Gln Thr Leu Leu Arg Cys Leu Lys Asp
 115 120 125
 Gly Glu Pro Val Leu Arg Met Pro Lys Val Thr Leu Val Asp Gly Val
 130 135 140
 Leu Gly Cys Gly Lys Thr Lys Glu Ile Leu Glu Thr Val Asn Phe Asp
 145 150 155 160
 Glu Glu Leu Ile Leu Val Pro Gly Lys Glu Ala Cys Lys Met Ile Ile
 165 170 175
 Lys Arg Ala Asn Lys Ser Gly His Val Arg Ala Thr Lys Asp Asn Val
 180 185 190
 Arg Thr Val Asp Ser Phe Leu Met His Leu Lys Pro Lys Thr Tyr Asn
 195 200 205
 Lys Leu Phe Ile Asp Glu Gly Leu Met Leu His Thr Gly Cys Val Asn
 210 215 220
 Phe Leu Ile Ala Leu Ser His Cys Arg Glu Ala Met Val Phe Gly Asp
 225 230 235 240
 Thr Glu Gln Ile Pro Phe Ile Asn Arg Val Ala Asn Phe Pro Tyr Pro
 245 250 255

NuCycle-0021.ST25.txt

Lys His Phe Gly His Thr Cys Leu His Arg Arg Glu Val Arg Arg Leu
260 265 270

Ser Leu Arg Cys Pro Ala Asp Val Thr His Phe Met Asn Ser Lys Tyr
275 280 285

Asp Gly Lys Phe Leu Cys Thr Asn Asp Val Ile Arg Ser Val Asp Ala
290 295 300

Glu Val Val Arg Gly Lys Gly Val Phe Asn Pro Lys Ser Lys Pro Leu
305 310 315 320

Lys Gly Lys Ile Ile Thr Phe Thr Gln Ser Asp Lys Ala Glu Leu Asn
325 330 335

Glu Arg Gly Tyr Glu Glu Val Ser Thr Phe Gly Glu Ile Asn Thr Val
340 345 350

His Glu Ile Gln Gly Glu Thr Phe Glu Asp Val Ser Val Val Arg Leu
355 360 365

Thr Pro Thr Ala Leu Glu Leu Ile Ser Lys Ser Ser Pro His Val Leu
370 375 380

Val Ala Leu Thr Arg His Thr Lys Ser Phe Lys Tyr Tyr Cys Val Val
385 390 395 400

Leu Asp Pro Leu Val Lys Val Cys Ser Asp Leu Ser Lys Val Ser Asp
405 410 415

Phe Ile Leu Asp Met Tyr Lys Val Asp Ala
420 425

<210> 24
<211> 421
<212> PRT
<213> Tobamovirus/TVCV

<400> 24

Gly Thr Met Met Ser Ala Val Tyr Thr Gly Ser Ile Lys Val Gln Gln
1 5 10 15

Met Lys Asn Tyr Ile Asp Tyr Leu Ser Ala Ser Leu Ala Ala Thr Val
20 25 30

Ser Asn Leu Cys Lys Val Leu Arg Asp Val His Gly Val Asp Pro Glu
35 40 45

NuCycle-0021.ST25.txt

Ser Gln Glu Lys Ser Gly Val Trp Asp Val Arg Arg Gly Arg Trp Leu
50 55 60

Leu Lys Pro Asn Ala Lys Ser His Ala Trp Gly Val Ala Glu Asp Ala
65 70 75 80

Asn His Lys Leu Val Ile Val Leu Leu Asn Trp Asp Asp Gly Lys Pro
85 90 95

Val Cys Asp Glu Thr Trp Phe Arg Val Ala Val Ser Ser Asp Ser Leu
100 105 110

Ile Tyr Ser Asp Met Gly Lys Leu Lys Thr Leu Thr Ser Cys Ser Pro
115 120 125

Asn Gly Glu Pro Pro Glu Pro Asn Ala Lys Val Ile Leu Val Asp Gly
130 135 140

Val Pro Gly Cys Gly Lys Thr Lys Glu Ile Ile Glu Lys Val Asn Phe
145 150 155 160

Ser Glu Asp Leu Ile Leu Val Pro Gly Lys Glu Ala Ser Lys Met Ile
165 170 175

Ile Arg Arg Ala Asn Gln Ala Gly Val Ile Arg Ala Asp Lys Asp Asn
180 185 190

Val Arg Thr Val Asp Ser Phe Leu Met His Pro Ser Arg Arg Val Phe
195 200 205

Lys Arg Leu Phe Ile Asp Glu Gly Leu Met Leu His Thr Gly Cys Val
210 215 220

Asn Phe Leu Leu Leu Leu Ser Gln Cys Asp Val Ala Tyr Val Tyr Gly
225 230 235 240

Asp Thr Lys Gln Ile Pro Phe Ile Cys Arg Val Ala Asn Phe Pro Tyr
245 250 255

Pro Ala His Phe Ala Lys Leu Val Ala Asp Glu Lys Glu Val Arg Arg
260 265 270

Val Thr Leu Arg Cys Pro Ala Asp Val Thr Tyr Phe Leu Asn Lys Lys
275 280 285

Tyr Asp Gly Ala Val Met Cys Thr Ser Ala Val Glu Arg Ser Val Lys

290

295

Ala Glu Val Val Arg Gly Lys Gly Ala Leu Asn Pro Ile Thr Leu Pro
305 310 315 320

Leu Glu Gly Lys Ile Leu Thr Phe Thr Gln Ala Asp Lys Phe Glu Leu
325 330 335

Leu Glu Lys Gly Tyr Lys Asp Val Asn Thr Val His Glu Val Gln Gly
340 345 350

Glu Thr Tyr Glu Lys Thr Ala Ile Val Arg Leu Thr Ser Thr Pro Leu
355 360 365

Glu Ile Ile Ser Ser Ala Ser Pro His Val Leu Val Ala Leu Thr Arg
370 375 380

His Thr Thr Cys Cys Lys Tyr Tyr Thr Val Val Leu Asp Pro Met Val
385 390 395 400

Asn Val Ile Ser Glu Met Glu Lys Leu Ser Asn Phe Leu Leu Asp Met
405 410 415

Tyr Arg Val Glu Ala
420

<210> 25
<211> 421
<212> PRT
<213> Tobamovirus/CR-TMV
<400> 25

Gly Thr Met Met Ser Ala Val Tyr Thr Gly Ser Ile Glu Val Arg Gln
1 5 10 15

Met Lys Asn Tyr Ile Asp Tyr Leu Ser Ala Ser Leu Ser Ala Thr Val
20 25 30

Ser Asn Leu Cys Lys Val Leu Arg Asp Val His Gly Val Asp Pro Glu
35 40 45

Ser Gln Glu Lys Ser Gly Val Trp Asp Val Arg Arg Gly Arg Trp Leu
50 55 60

Leu Lys Pro Asn Ala Lys Ser His Ala Trp Gly Val Ala Glu Asp Ala
65 70 75 80

Asn His Lys Leu Val Ile Val Leu Leu Asn Trp Asp Asp Gly Lys Pro
Page 20

Val Cys Asp Glu Thr Trp Phe Arg Val Ala Val Ser Ser Asp Ser Leu
100 105 110

Ile Tyr Ser Asp Met Gly Lys Leu Lys Thr Leu Thr Thr Cys Ser Pro
115 120 125

Asn Gly Glu Pro Pro Glu Pro Asn Ala Lys Val Ile Leu Val Asp Gly
130 135 140

Val Pro Gly Cys Gly Lys Thr Lys Glu Ile Ile Glu Lys Val Asn Phe
145 150 155 160

Ser Glu Asp Leu Ile Leu Val Pro Gly Lys Glu Ala Ser Lys Met Ile
165 170 175

Ile Arg Arg Ala Asn His Ala Gly Val Ile Arg Ala Asp Lys Asp Asn
180 185 190

Val Ser Thr Val Asp Ser Phe Leu Met His Pro Ser Arg Arg Val Phe
195 200 205

Lys Arg Leu Phe Ile Asp Glu Gly Leu Met Leu His Thr Gly Cys Val
210 215 220

Asn Phe Leu Leu Leu Leu Ser Gln Cys Asp Val Ala Tyr Val Tyr Gly
225 230 235 240

Asp Thr Gln Gln Ile Pro Phe Ile Cys Arg Val Ala Asn Phe Pro Tyr
245 250 255

Pro Ala His Phe Ala Lys Leu Val Ala Asp Glu Lys Glu Val Arg Arg
260 265 270

Val Thr Leu Arg Cys Pro Ala Asp Val Thr Tyr Phe Leu Asn Lys Lys
275 280 285

Tyr Asp Gly Ala Val Met Cys Thr Ser Ala Val Glu Arg Ser Val Lys
290 295 300

Ala Glu Val Val Arg Gly Lys Gly Ala Leu Asn Pro Ile Thr Leu Pro
305 310 315 320

Leu Glu Gly Lys Ile Leu Thr Phe Thr Gln Ala Asp Lys Phe Glu Leu
325 330 335

Leu Glu Lys Gly Tyr Lys Asp Val Asn Thr Val His Glu Val Gln Gly
340 345 350

Glu Thr Tyr Glu Lys Thr Ala Ile Val Arg Leu Thr Ser Thr Pro Leu
355 360 365

Glu Ile Ile Ser Arg Ala Ser Pro His Val Leu Val Ala Leu Thr Arg
370 375 380

His Thr Thr Arg Cys Lys Tyr Tyr Thr Val Val Leu Asp Pro Met Val
385 390 395 400

Asn Val Ile Ser Glu Met Glu Lys Leu Ser Asn Phe Leu Leu Asp Met
405 410 415

Tyr Arg Val Glu Ala
420

<210> 26
<211> 421
<212> PRT
<213> Tobamovirus/RMV-SH
<400> 26

Gly Ala Met Met Ser Ala Val Tyr Thr Gly Lys Ile Lys Val Gln Gln
1 5 10 15

Met Lys Asn Tyr Val Asp Tyr Leu Ser Ala Ser Leu Ser Ala Thr Val
20 25 30

Ser Asn Leu Cys Lys Val Leu Arg Asp Val His Gly Val Asp Pro Glu
35 40 45

Ser Gln Glu Lys Ser Gly Val Trp Asp Val Arg Arg Gly Arg Trp Leu
50 55 60

Leu Lys Pro Asn Ala Lys Cys His Ala Trp Gly Val Ala Glu Asp Ala
65 70 75 80

Asn His Lys Leu Val Ile Val Leu Leu Asn Trp Asp Glu Gly Asn Pro
85 90 95

Val Cys Asp Glu Thr Trp Phe Arg Leu Ala Val Ser Ser Asp Ser Leu
100 105 110

Val Tyr Ser Asp Met Gly Lys Leu Lys Thr Leu Thr Ala Cys Cys Arg
115 120 125

NuCycle-0021.ST25.txt

Asp Gly Glu Pro Pro Glu Pro Thr Ala Lys Val Val Leu Val Asp Gly
130 135 140

Val Pro Gly Cys Gly Lys Thr Lys Glu Ile Leu Glu Lys Val Asn Phe
145 150 155 160

Ser Glu Asp Leu Val Leu Val Pro Gly Lys Glu Ala Ser Lys Met Ile
165 170 175

Ile Arg Arg Ala Asn Gln Ala Gly Val Thr Arg Ala Asp Lys Asp Asn
180 185 190

Val Arg Thr Val Asp Ser Phe Leu Met His Pro Pro Lys Arg Val Phe
195 200 205

Lys Arg Leu Phe Ile Asp Glu Gly Leu Met Leu His Thr Gly Cys Val
210 215 220

Asn Phe Leu Thr Leu Leu Ser His Cys Asp Val Ala Tyr Val Tyr Gly
225 230 235 240

Asp Thr Gln Gln Ile Pro Phe Ile Cys Arg Val Ala Asn Phe Pro Tyr
245 250 255

Pro Ser His Phe Ala Lys Leu Val Val Asp Glu Lys Glu Asp Arg Arg
260 265 270

Val Thr Leu Arg Cys Pro Ala Asp Val Thr Tyr Phe Leu Asn Thr Arg
275 280 285

Tyr Asp Gly Ser Val Met Cys Thr Ser Ser Val Glu Arg Ser Val Ser
290 295 300

Ala Glu Val Val Arg Gly Lys Gly Ala Leu Asn Pro Ile Thr Leu Pro
305 310 315 320

Leu Glu Gly Lys Ile Leu Thr Phe Thr Gln Ala Asp Lys Phe Glu Leu
325 330 335

Leu Asp Lys Gly Tyr Lys Asp Val Asn Thr Val His Glu Val Gln Gly
340 345 350

Glu Thr Tyr Glu Lys Thr Ala Ile Val Arg Leu Thr Ala Thr Pro Leu
355 360 365

Glu Ile Ile Ser Arg Ala Ser Pro His Val Leu Val Ala Leu Thr Arg
370 375 380

NuCycle-0021.ST25.txt

His Thr Thr Arg Cys Lys Tyr Tyr Thr Val Val Leu Asp Pro Met Val
385 390 395 400

Asn Val Ile Ser Glu Leu Gly Lys Leu Ser Asn Phe Leu Leu Glu Met
405 410 415

Tyr Lys Val Glu Ser
420

<210> 27
<211> 421
<212> PRT
<213> Tobamovirus/CRMV
<400> 27

Gly Ala Met Met Ser Ala Val Tyr Thr Gly Lys Ile Lys Val Gln Gln
1 5 10 15

Met Lys Asn Tyr Val Asp Tyr Leu Ser Ala Ser Leu Ser Ala Thr Val
20 25 30

Ser Asn Leu Cys Lys Val Leu Arg Asp Val His Gly Val Asp Pro Glu
35 40 45

Ser Gln Glu Lys Ser Gly Val Trp Asp Val Arg Arg Gly Arg Trp Leu
50 55 60

Leu Lys Pro Asn Ala Lys Cys His Ala Trp Gly Val Ala Glu Asp Ala
65 70 75 80

Asn His Lys Leu Val Ile Val Leu Leu Asn Trp Asp Glu Gly Lys Pro
85 90 95

Val Cys Asp Glu Thr Trp Phe Arg Leu Ala Val Ser Ser Asp Ser Leu
100 105 110

Val Tyr Ser Asp Met Gly Lys Leu Lys Thr Leu Thr Ser Cys Cys Arg
115 120 125

Asp Gly Glu Pro Pro Glu Pro Thr Ala Lys Leu Val Leu Val Asp Gly
130 135 140

Val Pro Gly Cys Gly Lys Thr Lys Glu Ile Leu Glu Lys Val Asn Phe
145 150 155 160

Ser Glu Asp Leu Val Leu Val Pro Gly Lys Glu Ala Ser Lys Met Ile
165 170 175

NuCycle-0021.ST25.txt

Ile Arg Arg Ala Asn Gln Ala Gly Ile Thr Arg Ala Asp Lys Asp Asn
180 185 190

Val Arg Thr Val Asp Ser Phe Leu Met His Pro Pro Lys Arg Val Phe
195 200 205

Lys Arg Leu Phe Ile Asp Glu Gly Leu Met Leu His Thr Gly Cys Val
210 215 220

Asn Phe Leu Met Leu Leu Ser His Cys Asp Val Ala Tyr Val Tyr Val
225 230 235 240

Asp Thr Gln Gln Ile Pro Phe Ile Cys Arg Val Ala Asn Phe Pro Tyr
245 250 255

Pro Ala His Phe Ala Lys Leu Val Val Asp Glu Lys Glu Asp Arg Arg
260 265 270

Val Thr Leu Arg Cys Pro Ala Asp Val Thr Tyr Phe Leu Asn Gln Lys
275 280 285

Tyr Asp Gly Ser Val Leu Cys Thr Ser Ser Val Glu Arg Ser Val Ser
290 295 300

Ala Glu Val Val Arg Gly Lys Gly Ala Leu Asn Pro Ile Thr Leu Pro
305 310 315 320

Leu Glu Gly Lys Ile Leu Thr Phe Thr Gln Ala Asp Lys Phe Glu Leu
325 330 335

Leu Asp Lys Gly Tyr Lys Asp Val Asn Thr Val His Glu Val Gln Gly
340 345 350

Glu Thr Tyr Glu Lys Thr Ala Ile Val Arg Leu Thr Ala Thr Pro Leu
355 360 365

Glu Ile Ile Ser Arg Ala Ser Pro His Val Leu Val Ala Leu Thr Arg
370 375 380

His Thr Thr Arg Cys Lys Tyr Tyr Thr Val Val Leu Asp Pro Met Val
385 390 395 400

Asn Val Ile Ser Glu Leu Gly Lys Leu Ser Asn Phe Leu Leu Glu Met
405 410 415

Tyr Lys Val Glu Ser
420

NuCycle-0021.ST25.txt

<210> 28
 <211> 421
 <212> PRT
 <213> Tobamovirus/TMV-CG

<400> 28

Gly Ala Met Met Ser Ala Val Tyr Thr Gly Lys Ile Lys Val Gln Gln
 1 5 10 15

Met Lys Asn Tyr Val Asp Tyr Leu Ser Ala Ser Leu Ser Ala Thr Val
 20 25 30

Ser Asn Leu Cys Lys Val Leu Arg Asp Val His Gly Val Asp Ser Glu
 35 40 45

Ser Gln Glu Lys Ser Gly Val Trp Asp Val Arg Arg Gly Arg Trp Leu
 50 55 60

Leu Lys Pro Asn Ala Lys Cys His Ala Trp Gly Val Ala Glu Asp Ala
 65 70 75 80

Asn His Lys Leu Val Ile Val Leu Leu Asn Trp Asp Glu Gly Lys Pro
 85 90 95

Val Cys Asp Glu Thr Trp Phe Arg Leu Ala Val Ser Ser Asp Ser Leu
 100 105 110

Val Tyr Ser Asp Met Gly Lys Leu Lys Thr Leu Thr Ala Cys Cys Arg
 115 120 125

Asp Gly Glu Pro Pro Glu Pro Thr Ala Lys Val Val Leu Val Asp Gly
 130 135 140

Val Pro Gly Cys Gly Lys Thr Lys Glu Ile Leu Glu Lys Val Asn Phe
 145 150 155 160

Ser Glu Asp Leu Val Leu Val Pro Gly Lys Glu Ala Ser Lys Met Ile
 165 170 175

Ile Arg Arg Ala Asn Gln Ala Gly Ile Ile Arg Ala Asp Lys Asp Asn
 180 185 190

Val Arg Thr Val Asp Ser Phe Leu Met His Pro Pro Lys Arg Glu Phe
 195 200 205

Lys Arg Leu Phe Ile Asp Glu Gly Leu Met Leu His Thr Gly Cys Val
 210 215 220

NuCycle-0021.ST25.txt

Asn Phe Leu Thr Leu Leu Ser His Cys Glu Val Ala Tyr Val Tyr Gly
225 230 235 240

Asp Thr Gln Gln Ile Pro Phe Ile Cys Arg Val Ala Asn Phe Pro Tyr
245 250 255

Pro Lys His Phe Ala Lys Leu Val Val Asp Glu Lys Glu Asp Arg Arg
260 265 270

Val Thr Leu Arg Cys Pro Ala Asp Val Thr Phe Phe Leu Asn Lys Lys
275 280 285

Tyr Asp Gly Ala Val Leu Cys Thr Ser Ser Val Glu Arg Ser Val Ser
290 295 300

Ala Glu Val Val Arg Gly Lys Gly Ala Leu Asn Pro Ile Thr Leu Pro
305 310 315 320

Leu Glu Gly Lys Ile Leu Thr Phe Thr Gln Ala Asp Lys Phe Glu Leu
325 330 335

Leu Asp Lys Gly Tyr Lys Asp Val Asn Thr Val His Glu Val Gln Gly
340 345 350

Glu Thr Tyr Glu Lys Thr Ala Ile Val Arg Leu Thr Ala Thr Pro Leu
355 360 365

Glu Ile Ile Ser Arg Ala Ser Pro His Val Leu Val Ala Leu Thr Arg
370 375 380

His Thr Thr Arg Cys Lys Tyr Tyr Thr Val Val Leu Asp Pro Met Val
385 390 395 400

Asn Val Ile Ser Glu Met Glu Lys Leu Ser Asn Phe Ile Leu Asp Met
405 410 415

Tyr Lys Val Glu Ser
420

<210> 29
<211> 420
<212> PRT
<213> Tobamovirus/CGMMV

<400> 29

Lys Thr Ile Thr Pro Val Val Tyr Thr Gly Thr Ile Arg Glu Arg Gln
1 5 10 15

NuCycle-0021.ST25.txt

Met Lys Asn Tyr Ile Asp Tyr Leu Ser Ala Ser Leu Gly Ser Thr Leu
20 25 30

Gly Asn Leu Glu Arg Ile Val Arg Ser Asp Trp Asn Gly Thr Glu Glu
35 40 45

Ser Met Gln Thr Phe Gly Leu Tyr Asp Cys Glu Lys Cys Lys Trp Leu
50 55 60

Leu Leu Pro Ala Glu Lys Lys His Ala Trp Ala Val Val Leu Ala Ser
65 70 75 80

Asp Asp Thr Thr Arg Ile Ile Phe Leu Ser Tyr Asp Glu Ser Gly Ser
85 90 95

Pro Ile Ile Asp Lys Lys Asn Trp Lys Arg Phe Ala Val Cys Ser Glu
100 105 110

Thr Lys Val Tyr Ser Val Ile Arg Ser Leu Glu Val Leu Asn Lys Glu
115 120 125

Ala Ile Val Asp Pro Gly Val His Ile Thr Leu Val Asp Gly Val Pro
130 135 140

Gly Cys Gly Lys Thr Ala Glu Ile Ile Ala Arg Val Asn Trp Lys Thr
145 150 155 160

Asp Leu Val Leu Thr Pro Gly Arg Glu Ala Ala Ala Met Ile Arg Arg
165 170 175

Arg Ala Cys Ala Leu His Lys Ser Pro Val Ala Thr Asn Asp Asn Val
180 185 190

Arg Thr Phe Asp Ser Phe Val Met Asn Arg Lys Ile Phe Lys Phe Asp
195 200 205

Ala Val Tyr Val Asp Glu Gly Leu Met Val His Thr Gly Leu Leu Asn
210 215 220

Phe Ala Leu Lys Ile Ser Gly Cys Lys Lys Ala Phe Val Phe Gly Asp
225 230 235 240

Ala Lys Gln Ile Pro Phe Ile Asn Arg Val Met Asn Phe Asp Tyr Pro
245 250 255

Lys Glu Leu Arg Thr Leu Ile Val Asp Asn Val Glu Arg Arg Tyr Val

260

Thr His Arg Cys Pro Arg Asp Val Thr Ser Phe Leu Asn Thr Ile Tyr
275 280 285

Lys Ala Ala Val Ala Thr Thr Ser Pro Val Val His Ser Val Lys Ala
290 295 300

Ile Lys Val Ser Gly Ala Gly Ile Leu Arg Pro Glu Leu Thr Lys Ile
305 310 315 320

Lys Gly Lys Ile Ile Thr Phe Thr Gln Ser Asp Lys Gln Ser Leu Ile
325 330 335

Lys Ser Gly Tyr Asn Asp Val Asn Thr Val His Glu Ile Gln Gly Glu
340 345 350

Thr Phe Glu Glu Thr Ala Val Val Arg Ala Thr Pro Thr Pro Ile Gly
355 360 365

Leu Ile Ala Arg Asp Ser Pro His Val Leu Val Ala Leu Thr Arg His
370 375 380

Thr Lys Ala Met Val Tyr Tyr Thr Val Val Phe Asp Ala Val Thr Ser
385 390 395 400

Ile Ile Ala Asp Val Glu Lys Val Asp Gln Ser Ile Leu Thr Met Phe
405 410 415

Ala Thr Thr Val
420

<210> 30
<211> 420
<212> PRT
<213> Tobamovirus/CGMMV-W

<400> 30

Lys Thr Ile Thr Pro Val Val Tyr Thr Gly Thr Ile Arg Glu Arg Gln
1 5 10 15

Met Lys Asn Tyr Ile Asp Tyr Leu Ser Ala Ser Leu Gly Ser Thr Leu
20 25 30

Gly Asn Leu Glu Arg Ile Val Arg Ser Asp Trp Asn Gly Thr Glu Glu
35 40 45

Ser Met Gln Thr Phe Gly Leu Tyr Asp Cys Glu Lys Cys Lys Trp Leu
Page 29

50

55

Leu Leu Pro Ala Glu Lys Lys His Ala Trp Ala Val Val Leu Ala Ser
65 70 75 80

Asp Asp Thr Thr Arg Ile Ile Phe Leu Ser Tyr Asp Glu Ser Gly Ser
85 90 95

Pro Ile Ile Asp Lys Lys Asn Trp Lys Arg Phe Ala Val Cys Ser Glu
100 105 110

Thr Lys Val Tyr Ser Val Ile Arg Ser Leu Glu Val Leu Asn Lys Glu
115 120 125

Ala Ile Val Asp Pro Gly Val His Ile Thr Leu Val Asp Gly Val Pro
130 135 140

Gly Cys Gly Lys Thr Ala Glu Ile Ile Ala Arg Val Asn Trp Lys Thr
145 150 155 160

Asp Leu Val Leu Thr Pro Gly Arg Glu Ala Ala Ala Met Ile Arg Arg
165 170 175

Arg Ala Cys Ala Leu His Lys Ser Pro Val Ala Thr Asn Asp Asn Val
180 185 190

Arg Thr Phe Asp Ser Phe Val Met Asn Arg Lys Ile Phe Lys Phe Asp
195 200 205

Ala Val Tyr Val Asp Glu Gly Leu Met Val His Thr Gly Leu Leu Asn
210 215 220

Phe Ala Leu Lys Ile Ser Gly Cys Lys Lys Ala Phe Val Phe Gly Asp
225 230 235 240

Ala Lys Gln Ile Pro Phe Ile Asn Arg Val Met Asn Phe Asp Tyr Pro
245 250 255

Lys Glu Leu Arg Thr Leu Ile Val Asp Asn Val Glu Arg Arg Tyr Val
260 265 270

Thr His Arg Cys Pro Arg Asp Val Thr Ser Phe Leu Asn Thr Ile Tyr
275 280 285

Lys Ala Ala Val Ala Thr Thr Ser Pro Val Val His Ser Val Lys Ala
290 295 300

NuCycle-0021.ST25.txt

Ile Lys Val Ser Gly Ala Gly Ile Leu Arg Pro Glu Leu Thr Lys Ile
305 310 315 320

Lys Gly Lys Ile Ile Thr Phe Thr Gln Ser Asp Lys Gln Ser Leu Ile
325 330 335

Lys Ser Gly Tyr Asn Asp Val Asn Thr Val His Glu Ile Gln Gly Glu
340 345 350

Thr Phe Glu Glu Thr Ala Val Val Arg Ala Thr Pro Thr Pro Ile Gly
355 360 365

Leu Ile Ala Arg Asp Ser Pro His Val Leu Val Ala Leu Thr Arg His
370 375 380

Thr Lys Ala Met Val Tyr Tyr Thr Val Val Phe Asp Ala Val Thr Ser
385 390 395 400

Ile Ile Ala Asp Val Glu Lys Val Asp Gln Ser Ile Leu Thr Met Phe
405 410 415

Ala Thr Thr Val
420

<210> 31
<211> 419
<212> PRT
<213> Tobamovirus/CFMMV

<400> 31

Lys Thr Ile Thr Pro Val Ile Tyr Thr Gly Pro Ile Arg Val Arg Gln
1 5 10 15

Met Ala Asn Tyr Leu Asp Tyr Leu Ser Ala Asn Leu Ala Ala Thr Ile
20 25 30

Gly Ile Leu Glu Arg Ile Val Arg Ser Asn Trp Ser Gly Asn Glu Val
35 40 45

Val Gln Thr Tyr Gly Leu Phe Asp Cys Gln Ala Asn Lys Trp Ile Leu
50 55 60

Leu Pro Ser Glu Lys Thr His Ser Trp Gly Val Cys Leu Thr Met Asp
65 70 75 80

Asp Lys Leu Arg Val Val Leu Leu Gln Tyr Asp Ser Ala Gly Trp Pro
85 90 95

NuCycle-0021.ST25.txt

Ile Val Asp Lys Ser Phe Trp Lys Ala Phe Cys Val Cys Ala Asp Thr
100 105 110

Lys Val Phe Ser Val Ile Arg Ser Leu Glu Val Leu Ser Ala Leu Pro
115 120 125

Leu Val Glu Pro Asp Ala Lys Tyr Val Leu Ile Asp Gly Val Pro Gly
130 135 140

Cys Gly Lys Thr Gln Glu Ile Ile Ser Ser Ala Asp Phe Lys Thr Asp
145 150 155 160

Leu Ile Leu Thr Pro Gly Lys Glu Ala Ala Ala Met Ile Arg Arg Arg
165 170 175

Ala Asn Met Lys Tyr Arg Ser Pro Val Ala Thr Asn Asp Asn Val Arg
180 185 190

Thr Phe Asp Ser Phe Val Met Asn Lys Lys Pro Phe Thr Phe Lys Thr
195 200 205

Leu Trp Val Asp Glu Gly Leu Met Val His Thr Gly Leu Leu Asn Phe
210 215 220

Cys Val Asn Ile Ala Lys Val Lys Glu Val Arg Ile Phe Gly Asp Thr
225 230 235 240

Lys Gln Ile Pro Phe Ile Asn Arg Val Met Asn Phe Asp Tyr Pro Leu
245 250 255

Glu Leu Arg Lys Ile Ile Val Asp Thr Val Glu Lys Arg Tyr Thr Ser
260 265 270

Lys Arg Cys Pro Arg Asp Val Thr His Tyr Leu Asn Glu Val Tyr Ser
275 280 285

Ser Pro Val Cys Thr Thr Ser Pro Val Val His Ser Val Thr Thr Lys
290 295 300

Lys Ile Ala Gly Val Gly Leu Leu Arg Pro Glu Leu Thr Ala Leu Pro
305 310 315 320

Gly Lys Ile Ile Thr Phe Thr Gln Asn Asp Lys Gln Thr Leu Leu Lys
325 330 335

Ala Gly Tyr Ala Asp Val Asn Thr Val His Glu Val Gln Gly Glu Thr
340 345 350

NuCycle-0021.ST25.txt

Tyr Glu Glu Thr Ser Val Val Arg Ala Thr Ala Thr Pro Ile Gly Leu
355 360 365

Ile Ser Arg Lys Ser Pro His Val Leu Val Ala Leu Ser Arg His Thr
370 375 380

Lys Ala Met Thr Tyr Tyr Thr Val Thr Val Asp Pro Val Ser Cys Ile
385 390 395 400

Ile Ala Asp Leu Glu Lys Val Asp Gln Ser Ile Leu Ser Met Tyr Ala
405 410 415

Ser Val Ala

<210> 32
<211> 420
<212> PRT
<213> Tobamovirus/YCGMMV
<400> 32

Lys Ser Ile Thr Pro Val Ile Tyr Thr Gly Pro Ile Arg Val Arg Gln
1 5 10 15

Met Ala Asn Tyr Leu Asp Tyr Leu Ser Ala Ser Leu Thr Ala Thr Ile
20 25 30

Gly Asn Leu Glu Arg Ile Val Ser Ser Ser Trp Thr Gly Glu Asn Glu
35 40 45

Leu Val Gln Thr Tyr Gly Leu Phe Asp Cys Gln Ala Asp Lys Trp Ile
50 55 60

Leu Gln Pro Thr Glu Arg Thr His Ser Trp Gly Val Cys Leu Thr Met
65 70 75 80

Asp Asp Lys Leu Arg Ile Val Leu Leu Gln Tyr Asp Glu Phe Asp Trp
85 90 95

Pro Ile Val Asp Lys Ser Ser Trp Lys Ala Phe Cys Val Ser Ala Asp
100 105 110

Thr Lys Val Phe Ser Ile Ile Arg Ser Leu Glu Val Leu Ser Ser Leu
115 120 125

Pro Leu Ser Asp Pro Thr Ala Lys Phe Thr Leu Ile Asp Gly Val Pro
130 135 140

NuCycle-0021.ST25.txt

Gly Cys Gly Lys Thr Gln Glu Ile Ile Asn Ser Ala Asp Phe Lys Thr
 145 150 155 160
 Asp Leu Ile Leu Thr Pro Gly Lys Glu Ser Ala Ala Met Ile Arg Arg
 165 170 175
 Arg Ala Asn Ala Lys Phe Arg Gly Cys Val Ala Thr Asn Asp Asn Val
 180 185 190
 Arg Thr Phe Asp Ser Phe Val Met Asn Lys Lys Pro Phe Thr Phe Lys
 195 200 205
 Thr Leu Trp Val Asp Glu Gly Leu Met Val His Thr Gly Leu Leu Asn
 210 215 220
 Phe Cys Val Asn Ile Ala Lys Val Lys Glu Val Lys Ile Phe Gly Asp
 225 230 235 240
 Thr Lys Gln Ile Pro Phe Ile Asn Arg Val Met Asn Phe Asp Tyr Pro
 245 250 255
 Leu Glu Leu Lys Lys Ile Ile Val Asp Asp Val Glu Lys Arg Tyr Thr
 260 265 270
 Ser Lys Arg Cys Pro Arg Asp Val Thr His Tyr Leu Asn Glu Val Tyr
 275 280 285
 Ala Ala Pro Val Thr Thr Ser Ser Ala Val Val His Ser Val Ser Gln
 290 295 300
 Lys Lys Ile Ala Gly Val Gly Leu Leu Arg Pro Glu Leu Thr Ser Leu
 305 310 315 320
 Glu Gly Lys Ile Ile Thr Phe Thr Gln Ser Asp Lys Gln Thr Leu Leu
 325 330 335
 Lys Ala Gly Tyr Glu Asp Val Asn Thr Val His Glu Val Gln Gly Glu
 340 345 350
 Thr Tyr Glu Cys Thr Ser Val Val Arg Ala Thr Ala Thr Pro Ile Gly
 355 360 365
 Leu Ile Ser Arg Lys Ser Pro His Val Leu Val Ala Leu Ser Arg His
 370 375 380
 Thr Lys Thr Met Thr Tyr Tyr Thr Val Thr Val Asp Pro Val Ser Cys
 385 390 395 400

NuCycle-0021.ST25.txt

Ile Ile Ala Asp Leu Glu Lys Val Asp Gln Ser Ile Leu Ser Met Tyr
405 410 415

Ala Thr Val Ala
420

<210> 33
<211> 419
<212> PRT
<213> Tobamovirus/SHMV

<400> 33

Gln Lys Pro Val Asn Ile Val Tyr Thr Gly Glu Val Gln Ile Cys Gln
1 5 10 15

Met Gln Asn Tyr Leu Asp Tyr Leu Ser Ala Ser Leu Val Ala Cys Ile
20 25 30

Ser Asn Leu Lys Lys Tyr Leu Gln Asp Gln Trp Leu Asn Pro Gly Glu
35 40 45

Lys Phe Gln Lys Ile Gly Val Trp Asp Asn Leu Asn Asn Lys Trp Ile
50 55 60

Val Val Pro Gln Lys Lys Lys Tyr Ala Trp Gly Leu Ala Ala Asp Val
65 70 75 80

Asp Gly Asn Gln Lys Thr Val Ile Leu Asn Tyr Asp Glu His Gly Met
85 90 95

Pro Ile Leu Glu Lys Ser Tyr Val Arg Leu Val Val Ser Thr Asp Thr
100 105 110

Tyr Leu Phe Thr Val Val Ser Met Leu Gly Tyr Leu Arg His Leu Asp
115 120 125

Gln Lys Lys Pro Thr Ala Thr Ile Thr Leu Val Asp Gly Val Pro Gly
130 135 140

Cys Gly Lys Thr Gln Glu Ile Leu Ser Arg Phe Asp Ala Asn Ser Asp
145 150 155 160

Leu Ile Leu Val Gln Gly Arg Glu Ala Cys Glu Met Ile Arg Arg Arg
165 170 175

Ala Asn Asp Asn Val Pro Gly Ser Ala Thr Lys Glu Asn Val Arg Thr
180 185 190

NuCycle-0021.ST25.txt

Phe Asp Ser Phe Val Met Asn Arg Lys Pro Gly Lys Phe Lys Thr Leu
 195 200 205
 Trp Val Asp Glu Gly Leu Met Val His Pro Gly Leu Ile Asn Phe Cys
 210 215 220
 Ile Asn Ile Ser Cys Val Ser Ser Val Tyr Ile Phe Gly Asp Arg Lys
 225 230 235 240
 Gln Ile Pro Phe Ile Asn Arg Val Met Asn Phe Ser Ile Pro Asp Asn
 245 250 255
 Leu Ala Lys Leu Tyr Tyr Asp Glu Ile Val Ser Arg Asp Thr Thr Lys
 260 265 270
 Arg Cys Pro Leu Asp Val Thr His Phe Leu Asn Ser Val Tyr Glu Lys
 275 280 285
 Arg Val Met Ser Tyr Ser Asn Val Gln Arg Ser Leu Glu Cys Lys Met
 290 295 300
 Ile Ser Gly Lys Ala Lys Ile Asn Asp Tyr Arg Ser Ile Leu Ala Glu
 305 310 315 320
 Gly Lys Leu Leu Thr Phe Thr Gln Glu Asp Lys Glu Tyr Leu Leu Lys
 325 330 335
 Ala Gly Phe Lys Asp Val Asn Thr Val His Glu Ala Gln Gly Glu Thr
 340 345 350
 Tyr Arg Asp Val Asn Leu Ile Arg Val Thr Ala Thr Pro Leu Thr Ile
 355 360 365
 Val Ser Ala Gly Ser Pro His Val Thr Val Ala Leu Ser Arg His Thr
 370 375 380
 Asn Arg Phe Val Tyr Tyr Thr Val Val Pro Asp Val Val Met Thr Thr
 385 390 395 400
 Val Gln Lys Thr Gln Cys Val Ser Asn Phe Leu Leu Asp Met Tyr Ala
 405 410 415
 Val Ala Tyr

NuCycle-0021.ST25.txt

<211> 468

<212> PRT

<213> Tobamovirus/TMV-vu1

<400> 34

Met Gln Phe Tyr Tyr Asp Lys Cys Leu Pro Gly Asn Ser Thr Met Met
1 5 10 15

Asn Asn Phe Asp Ala Val Thr Met Arg Leu Thr Asp Ile Ser Leu Asn
20 25 30

Val Lys Asp Cys Ile Leu Asp Met Ser Lys Ser Val Ala Ala Pro Lys
35 40 45

Asp Gln Ile Lys Pro Leu Ile Pro Met Val Arg Thr Ala Ala Glu Met
50 55 60

Pro Arg Gln Thr Gly Leu Leu Glu Asn Leu Val Ala Met Ile Lys Arg
65 70 75 80

Asn Phe Asn Ala Pro Glu Leu Ser Gly Ile Ile Asp Ile Glu Asn Thr
85 90 95

Ala Ser Leu Val Val Asp Lys Phe Phe Asp Ser Tyr Leu Leu Lys Glu
100 105 110

Lys Arg Lys Pro Asn Lys Asn Val Ser Leu Phe Ser Arg Glu Ser Leu
115 120 125

Asn Arg Trp Leu Glu Lys Gln Glu Gln Val Thr Ile Gly Gln Leu Ala
130 135 140

Asp Phe Asp Phe Val Asp Leu Pro Ala Val Asp Gln Tyr Arg His Met
145 150 155 160

Tyr Lys Ala Gln Pro Lys Gln Lys Leu Asp Thr Ser Ile Gln Thr Glu
165 170 175

Tyr Pro Ala Leu Gln Thr Ile Val Tyr His Ser Lys Lys Ile Asn Ala
180 185 190

Ile Phe Gly Pro Leu Phe Ser Glu Leu Thr Arg Gln Leu Leu Asp Ser
195 200 205

Val Asp Ser Ser Arg Phe Leu Phe Phe Thr Arg Lys Thr Pro Ala Gln
210 215 220

Ile Glu Asp Phe Phe Gly Asp Leu Asp Ser His Val Pro Met Asp Val
Page 37

225 230 235 240
 Leu Glu Leu Asp Ile Ser Lys Tyr Asp Lys Ser Gln Asn Glu Phe His
 245 250 255
 Cys Ala Val Glu Tyr Glu Ile Trp Arg Arg Leu Gly Phe Glu Asp Phe
 260 265 270
 Leu Gly Glu Val Trp Lys Gln Gly His Arg Lys Thr Thr Leu Lys Asp
 275 280 285
 Tyr Thr Ala Gly Ile Lys Thr Cys Ile Trp Tyr Gln Arg Lys Ser Gly
 290 295 300
 Asp Val Thr Thr Phe Ile Gly Asn Thr Val Ile Ile Ala Ala Cys Leu
 305 310 315 320
 Ala Ser Met Leu Pro Met Glu Lys Ile Ile Lys Gly Ala Phe Cys Gly
 325 330 335
 Asp Asp Ser Leu Leu Tyr Phe Pro Lys Gly Cys Glu Phe Pro Asp Val
 340 345 350
 Gln His Ser Ala Asn Leu Met Trp Asn Phe Glu Ala Lys Leu Phe Lys
 355 360 365
 Lys Gln Tyr Gly Tyr Phe Cys Gly Arg Tyr Val Ile His His Asp Arg
 370 375 380
 Gly Cys Ile Val Tyr Tyr Asp Pro Leu Lys Leu Ile Ser Lys Leu Gly
 385 390 395 400
 Ala Lys His Ile Lys Asp Trp Glu His Leu Glu Glu Phe Arg Arg Ser
 405 410 415
 Leu Cys Asp Val Ala Val Ser Leu Asn Asn Cys Ala Tyr Tyr Thr Gln
 420 425 430
 Leu Asp Asp Ala Val Trp Glu Val His Lys Thr Ala Pro Pro Gly Ser
 435 440 445
 Phe Val Tyr Lys Ser Leu Val Lys Tyr Leu Ser Asp Lys Val Leu Phe
 450 455 460
 Arg Ser Leu Phe
 465

NuCycle-0021.ST25.txt

<210> 35

<211> 468

<212> PRT

<213> Tobamovirus/TMV-Rak

<400> 35

Met Gln Phe Tyr Tyr Asp Lys Cys Leu Pro Gly Asn Ser Thr Met Met
1 5 10 15

Asn Asn Phe Asp Ala Val Thr Met Arg Leu Thr Asp Ile Ser Leu Asn
20 25 30

Val Lys Asp Cys Ile Leu Asp Met Ser Lys Ser Val Ala Ala Pro Lys
35 40 45

Asp Gln Ile Lys Pro Leu Ile Pro Met Val Arg Thr Ala Ala Glu Met
50 55 60

Pro Arg Gln Thr Gly Leu Leu Glu Asn Leu Val Ala Met Ile Lys Arg
65 70 75 80

Asn Phe Asn Ala Pro Glu Leu Ser Gly Ile Ile Asp Ile Glu Asn Thr
85 90 95

Ala Ser Leu Val Val Asp Lys Phe Phe Asp Ser Tyr Leu Leu Lys Glu
100 105 110

Lys Arg Lys Pro Asn Lys Asn Val Ser Leu Phe Ser Arg Glu Ser Leu
115 120 125

Asn Arg Trp Leu Glu Lys Gln Glu Arg Val Thr Ile Gly Gln Leu Ala
130 135 140

Asp Phe Asp Phe Val Asp Leu Pro Ala Val Asp Gln Tyr Arg His Met
145 150 155 160

Ile Lys Ala Gln Pro Lys Gln Lys Leu Asp Thr Ser Ile Gln Thr Glu
165 170 175

Tyr Pro Ala Leu Gln Thr Ile Val Tyr His Ser Lys Lys Ile Asn Ala
180 185 190

Ile Phe Gly Pro Leu Phe Ser Glu Leu Thr Arg Gln Leu Leu Asp Ser
195 200 205

Val Asp Ser Ser Arg Phe Leu Phe Phe Thr Arg Lys Thr Pro Ala Gln
210 215 220

NuCycle-0021.ST25.txt

Ile Glu Asp Phe Phe Gly Asp Leu Asp Ser His Val Pro Met Asp Val
225 230 235 240

Leu Glu Leu Asp Ile Ser Lys Tyr Asp Lys Ser Gln Asn Glu Phe His
245 250 255

Cys Ala Val Glu Tyr Glu Ile Trp Arg Arg Leu Gly Phe Glu Asp Phe
260 265 270

Leu Gly Glu Val Trp Lys Gln Gly His Arg Lys Thr Thr Leu Lys Asp
275 280 285

Tyr Thr Ala Gly Ile Lys Thr Cys Ile Trp Tyr Gln Arg Lys Ser Gly
290 295 300

Asp Val Thr Thr Phe Ile Gly Asn Thr Val Ile Ile Ala Ala Cys Leu
305 310 315 320

Ala Ser Met Leu Arg Met Glu Lys Ile Ile Lys Gly Ala Phe Cys Gly
325 330 335

Asp Asp Ser Leu Leu Tyr Phe Pro Lys Gly Cys Glu Phe Pro Asp Ile
340 345 350

Gln His Ser Val Asn Leu Met Trp Asn Phe Glu Ala Lys Leu Phe Lys
355 360 365

Lys Gln Tyr Gly Tyr Phe Cys Gly Arg Tyr Ile Ile His His Asp Arg
370 375 380

Gly Cys Ile Val Tyr Tyr Asp Pro Leu Lys Leu Ile Ser Lys Leu Gly
385 390 395 400

Ala Lys His Ile Lys Asp Trp Glu His Leu Glu Glu Phe Arg Arg Ser
405 410 415

Leu Cys Asp Val Ala Val Ser Leu Asn Asn Cys Ala Tyr Tyr Thr Gln
420 425 430

Leu Asp Asp Ala Val Trp Glu Val His Lys Thr Ala Pro Pro Gly Ser
435 440 445

Phe Val Tyr Lys Ser Leu Val Lys Tyr Leu Ser Asp Lys Val Leu Phe
450 455 460

Arg Ser Leu Phe
465

NuCycle-0021.ST25.txt

<210> 36
 <211> 468
 <212> PRT
 <213> Tobamovirus/TMV-WANG

<400> 36

Met Gln Phe Tyr Tyr Asp Lys Cys Leu Pro Gly Asn Ser Thr Met Met
 1 5 10 15

Asn Asn Phe Asp Ala Val Thr Met Arg Leu Thr Asp Ile Ser Leu Asn
 20 25 30

Val Lys Asp Cys Ile Leu Asp Met Ser Lys Ser Val Ala Ala Pro Lys
 35 40 45

Asp Gln Ile Lys Pro Leu Ile Pro Met Val Arg Thr Ala Ala Glu Met
 50 55 60

Pro Arg Gln Thr Gly Leu Leu Glu Asn Leu Val Ala Met Ile Lys Arg
 65 70 75 80

Asn Phe Asn Ala Pro Glu Leu Ser Gly Ile Ile Asp Ile Glu Asn Thr
 85 90 95

Ala Ser Leu Val Val Asp Lys Phe Phe Asp Ser Tyr Leu Leu Lys Glu
 100 105 110

Lys Arg Lys Pro Asn Lys Asn Val Ser Leu Phe Ser Arg Glu Ser Leu
 115 120 125

Asn Arg Trp Leu Glu Lys Gln Glu Gln Val Thr Ile Gly Gln Leu Ala
 130 135 140

Asp Phe Asp Phe Val Asp Leu Pro Ala Val Asp Gln Tyr Arg His Met
 145 150 155 160

Ile Lys Ala Gln Pro Lys Gln Lys Leu Asp Thr Ser Ile Gln Thr Glu
 165 170 175

Tyr Pro Ala Leu Gln Thr Ile Val Tyr His Ser Lys Lys Ile Asn Ala
 180 185 190

Ile Phe Gly Pro Leu Phe Ser Glu Leu Thr Arg Gln Leu Leu Asp Ser
 195 200 205

Val Asp Ser Ser Arg Phe Leu Phe Phe Thr Arg Lys Thr Pro Ala Gln
 210 215 220

NuCycle-0021.ST25.txt

Ile Glu Asp Phe Phe Gly Asp Leu Asp Ser His Val Pro Met Asp Val
225 230 235 240

Leu Glu Leu Asp Ile Ser Lys Tyr Asp Lys Ser Gln Asn Glu Phe His
245 250 255

Cys Ala Val Glu Tyr Glu Ile Trp Arg Arg Leu Gly Phe Glu Asp Phe
260 265 270

Leu Gly Glu Val Trp Lys Gln Gly His Arg Lys Thr Thr Leu Lys Asp
275 280 285

Tyr Thr Ala Gly Ile Lys Thr Cys Ile Trp Tyr Gln Arg Lys Ser Gly
290 295 300

Asp Val Thr Thr Phe Ile Gly Asn Thr Val Ile Ile Ala Ala Cys Leu
305 310 315 320

Ala Ser Met Leu Pro Met Glu Lys Ile Ile Lys Gly Ala Phe Cys Gly
325 330 335

Asp Asp Ser Leu Leu Tyr Phe Pro Lys Gly Cys Glu Phe Pro Asp Val
340 345 350

Gln His Ser Ala Asn Leu Met Trp Asn Phe Glu Ala Lys Leu Phe Lys
355 360 365

Lys Gln Tyr Gly Tyr Phe Cys Gly Arg Tyr Val Ile His His Asp Arg
370 375 380

Gly Cys Ile Val Tyr Tyr Asp Pro Leu Lys Leu Ile Ser Lys Leu Gly
385 390 395 400

Ala Lys His Ile Lys Asp Trp Glu His Leu Glu Glu Phe Arg Arg Ser
405 410 415

Leu Cys Asp Val Ala Val Ser Leu Asn Asn Cys Ala Tyr Tyr Thr Gln
420 425 430

Leu Asp Asp Ala Val Trp Glu Val His Lys Thr Ala Pro Pro Gly Ser
435 440 445

Phe Val Tyr Lys Ser Leu Val Lys Tyr Leu Ser Asp Lys Val Leu Phe
450 455 460

Arg Ser Leu Phe
465

NuCycle-0021.ST25.txt

<210> 37
 <211> 468
 <212> PRT
 <213> Tobamovirus/TOMV-L

<400> 37

Met Gln Phe Tyr Tyr Asp Lys Cys Leu Pro Gly Asn Ser Thr Leu Leu
 1 5 10 15

Asn Asn Tyr Asp Ala Val Thr Met Lys Leu Thr Asp Ile Ser Leu Asn
 20 25 30

Val Lys Asp Cys Ile Leu Asp Met Ser Lys Ser Val Ala Ala Pro Lys
 35 40 45

Asp Val Lys Pro Thr Leu Ile Pro Met Val Arg Thr Ala Ala Glu Met
 50 55 60

Pro Arg Gln Thr Gly Leu Leu Glu Asn Leu Val Ala Met Ile Lys Arg
 65 70 75 80

Asn Phe Asn Ser Pro Glu Leu Ser Gly Val Val Asp Ile Glu Asn Thr
 85 90 95

Ala Ser Leu Val Val Asp Lys Phe Phe Asp Ser Tyr Leu Leu Lys Glu
 100 105 110

Lys Arg Lys Pro Asn Lys Asn Phe Ser Leu Phe Ser Arg Glu Ser Leu
 115 120 125

Asn Arg Trp Ile Ala Lys Gln Glu Gln Val Thr Ile Gly Gln Leu Ala
 130 135 140

Asp Phe Asp Phe Val Asp Leu Pro Ala Val Asp Gln Tyr Arg His Met
 145 150 155 160

Ile Lys Ala Gln Pro Lys Gln Lys Leu Asp Leu Ser Ile Gln Thr Glu
 165 170 175

Tyr Pro Ala Leu Gln Thr Ile Val Tyr His Ser Lys Lys Ile Asn Ala
 180 185 190

Ile Phe Gly Pro Leu Phe Ser Glu Leu Thr Arg Gln Leu Leu Asp Ser
 195 200 205

Ile Asp Ser Ser Arg Phe Leu Phe Phe Thr Arg Lys Thr Pro Ala Gln
 210 215 220

NuCycle-0021.ST25.txt

Ile Glu Asp Phe Phe Gly Asp Leu Asp Ser His Val Pro Met Asp Val
225 230 235 240

Leu Glu Leu Asp Val Ser Lys Tyr Asp Lys Ser Gln Asn Glu Phe His
245 250 255

Cys Ala Val Glu Tyr Glu Ile Trp Arg Arg Leu Gly Leu Glu Asp Phe
260 265 270

Leu Ala Glu Val Trp Lys Gln Gly His Arg Lys Thr Thr Leu Lys Asp
275 280 285

Tyr Thr Ala Gly Ile Lys Thr Cys Leu Trp Tyr Gln Arg Lys Ser Gly
290 295 300

Asp Val Thr Thr Phe Ile Gly Asn Thr Val Ile Ile Ala Ser Cys Leu
305 310 315 320

Ala Ser Met Leu Pro Met Glu Lys Leu Ile Lys Gly Ala Phe Cys Gly
325 330 335

Asp Asp Ser Leu Leu Tyr Phe Pro Lys Gly Cys Glu Tyr Pro Asp Ile
340 345 350

Gln Gln Ala Ala Asn Leu Met Trp Asn Phe Glu Ala Lys Leu Phe Lys
355 360 365

Lys Gln Tyr Gly Tyr Phe Cys Gly Arg Tyr Val Ile His His Asp Arg
370 375 380

Gly Cys Ile Val Tyr Tyr Asp Pro Leu Lys Leu Ile Ser Lys Leu Gly
385 390 395 400

Ala Lys His Ile Lys Asp Trp Asp His Leu Glu Glu Phe Arg Arg Ser
405 410 415

Leu Cys Asp Val Ala Glu Ser Leu Asn Asn Cys Ala Tyr Tyr Thr Gln
420 425 430

Leu Asp Asp Ala Val Gly Glu Val His Lys Thr Ala Pro Pro Gly Ser
435 440 445

Phe Val Tyr Lys Ser Leu Val Lys Tyr Leu Ser Asp Lys Val Leu Phe
450 455 460

Arg Ser Leu Phe

NuCycle-0021.ST25.txt

465

<210> 38
 <211> 467
 <212> PRT
 <213> Tobamovirus/TMV-KR

<400> 38

Met Gln Tyr Tyr Tyr Asp Lys Cys Leu Pro Gly Asn Ser Thr Ile Leu
 1 5 10 15

Asn Glu Tyr Asp Ala Val Thr Met Gln Ile Arg Glu Asn Ser Leu Asn
 20 25 30

Val Lys Asp Cys Val Leu Asp Met Ser Lys Ser Val Pro Leu Pro Arg
 35 40 45

Glu Ser Glu Thr Thr Leu Lys Pro Val Ile Arg Thr Ala Ala Glu Lys
 50 55 60

Pro Arg Lys Pro Gly Leu Leu Glu Asn Leu Val Ala Met Ile Lys Arg
 65 70 75 80

Asn Phe Asn Ser Pro Glu Leu Val Gly Val Val Asp Ile Glu Asp Thr
 85 90 95

Ala Ser Leu Val Val Asp Lys Phe Phe Asp Ala Tyr Leu Ile Lys Glu
 100 105 110

Lys Lys Lys Pro Lys Asn Ile Pro Leu Leu Ser Arg Ala Ser Leu Glu
 115 120 125

Arg Trp Ile Glu Lys Gln Glu Lys Ser Thr Ile Gly Gln Leu Ala Asp
 130 135 140

Phe Asp Phe Ile Asp Leu Pro Ala Val Asp Gln Tyr Arg His Met Ile
 145 150 155 160

Lys Gln Gln Pro Lys Gln Arg Leu Asp Leu Ser Ile Gln Thr Glu Tyr
 165 170 175

Pro Ala Leu Gln Thr Ile Val Tyr His Ser Lys Lys Ile Asn Ala Leu
 180 185 190

Phe Gly Pro Val Phe Ser Glu Leu Thr Arg Gln Leu Leu Glu Thr Ile
 195 200 205

Asp Ser Ser Arg Phe Met Phe Tyr Thr Arg Lys Thr Pro Thr Gln Ile
 Page 45

210

215

Glu Glu Phe Phe Ser Asp Leu Asp Ser Asn Val Pro Met Asp Ile Leu
225 230 235 240

Glu Leu Asp Ile Ser Lys Tyr Asp Lys Ser Gln Asn Glu Phe His Cys
245 250 255

Ala Val Glu Tyr Glu Ile Trp Lys Arg Leu Gly Leu Asp Asp Phe Leu
260 265 270

Ala Glu Val Trp Lys His Gly His Arg Lys Thr Thr Leu Lys Asp Tyr
275 280 285

Thr Ala Gly Ile Lys Thr Cys Leu Trp Tyr Gln Arg Lys Ser Gly Asp
290 295 300

Val Thr Thr Phe Ile Gly Asn Thr Ile Ile Ile Ala Ala Cys Leu Ser
305 310 315 320

Ser Met Leu Pro Met Glu Arg Leu Ile Lys Gly Ala Phe Cys Gly Asp
325 330 335

Asp Ser Ile Leu Tyr Phe Pro Lys Gly Thr Asp Phe Pro Asp Ile Gln
340 345 350

Gln Gly Ala Asn Leu Leu Trp Asn Phe Glu Ala Lys Leu Phe Arg Lys
355 360 365

Arg Tyr Gly Tyr Phe Cys Gly Arg Tyr Ile Ile His His Asp Arg Gly
370 375 380

Cys Ile Val Tyr Tyr Asp Pro Leu Lys Leu Ile Ser Lys Leu Gly Ala
385 390 395 400

Lys His Ile Lys Asn Arg Glu His Leu Glu Glu Phe Arg Thr Ser Leu
405 410 415

Cys Asp Val Ala Gly Ser Leu Asn Asn Cys Ala Tyr Tyr Thr His Leu
420 425 430

Asn Asp Ala Val Gly Glu Val Ile Lys Thr Ala Pro Leu Gly Ser Phe
435 440 445

Val Tyr Arg Ala Leu Val Lys Tyr Leu Cys Asp Lys Arg Leu Phe Gln
450 455 460

NuCycle-0021.ST25.txt

Thr Leu Phe
465

<210> 39
<211> 470
<212> PRT
<213> Tobamovirus/PMMV

<400> 39

Pro Asp Leu Gln Phe Tyr Tyr Asp Val Cys Leu Pro Gly Asn Ser Thr
1 5 10 15

Ile Leu Asn Lys Tyr Asp Ala Val Thr Met Arg Leu Arg Asp Asn Ser
20 25 30

Leu Asn Val Lys Asp Cys Val Leu Asp Phe Ser Lys Ser Ile Pro Met
35 40 45

Pro Lys Glu Val Lys Pro Cys Leu Glu Pro Val Leu Arg Thr Ala Ala
50 55 60

Glu Pro Pro Arg Ala Ala Gly Leu Leu Glu Asn Leu Val Ala Met Ile
65 70 75 80

Lys Arg Asn Phe Asn Ala Pro Asp Leu Thr Gly Thr Ile Asp Ile Glu
85 90 95

Ser Thr Ala Ser Val Val Val Asp Lys Phe Phe Asp Ser Tyr Phe Ile
100 105 110

Lys Lys Glu Lys Tyr Thr Lys Asn Ile Ala Gly Val Met Thr Lys Asp
115 120 125

Ser Met Met Arg Trp Leu Glu Asn Arg Lys Glu Val Leu Leu Asp Asp
130 135 140

Leu Ala Asn Tyr Asn Phe Thr Asp Leu Pro Ala Ile Asp Gln Tyr Lys
145 150 155 160

His Met Ile Lys Ala Gln Pro Lys Gln Lys Leu Asp Leu Ser Ile Gln
165 170 175

Asn Glu Tyr Pro Ala Leu Gln Thr Ile Val Tyr His Ser Lys Gln Ile
180 185 190

Asn Gly Ile Leu Ala Gly Phe Ser Glu Leu Thr Arg Leu Leu Leu Glu
195 200 205

NuCycle-0021.ST25.txt

Ala Phe Asp Ser Lys Lys Phe Leu Phe Phe Thr Arg Lys Thr Pro Glu
210 215 220

Gln Ile Gln Glu Phe Phe Ser Asp Leu Asp Ser His Val Pro Met Asp
225 230 235 240

Val Leu Glu Leu Asp Ile Ser Lys Tyr Asp Lys Ser Gln Asn Glu Phe
245 250 255

His Cys Ala Val Glu Tyr Glu Ile Trp Lys Arg Leu Gly Leu Asn Glu
260 265 270

Phe Leu Ala Glu Val Trp Lys Gln Gly His Arg Lys Thr Thr Leu Lys
275 280 285

Asp Tyr Ile Ala Gly Ile Lys Thr Cys Leu Trp Tyr Gln Arg Lys Ser
290 295 300

Gly Asp Val Thr Thr Phe Ile Gly Asn Thr Val Ile Ile Ala Ala Cys
305 310 315 320

Leu Gly Ser Met Leu Pro Met Glu Lys Val Ile Lys Gly Ala Phe Cys
325 330 335

Gly Asp Asp Ser Val Leu Tyr Phe Pro Lys Gly Leu Asp Phe Pro Asp
340 345 350

Ile Gln Ser Cys Ala Asn Leu Met Trp Asn Phe Glu Ala Lys Leu Tyr
355 360 365

Arg Lys Arg Tyr Gly Tyr Phe Cys Gly Arg Tyr Ile Ile His His Asp
370 375 380

Lys Gly Ala Ile Val Tyr Tyr Asp Pro Leu Lys Leu Ile Ser Lys Leu
385 390 395 400

Gly Ala Lys His Ile Lys Asp Tyr Asp His Leu Glu Glu Leu Arg Val
405 410 415

Ser Leu Cys Asp Val Ala Cys Ser Leu Gly Asn Trp Cys Leu Gly Phe
420 425 430

Pro Gln Leu Asn Ala Ala Ile Lys Glu Val His Lys Thr Ala Ile Asp
435 440 445

Gly Ser Phe Ala Phe Asn Cys Val Asn Lys Phe Leu Cys Asp Lys Phe
450 455 460

NuCycle-0021.ST25.txt

Leu Phe Arg Thr Leu Phe
465 470

<210> 40
<211> 458
<212> PRT
<213> Tobamovirus/TMGV

<400> 40

Met Gln Phe Tyr Tyr Asp Thr Leu Leu Pro Gly Asn Ser Thr Ile Leu
1 5 10 15

Asn Glu Tyr Asp Ala Val Thr Met Asn Leu Arg Glu Asn Asn Leu Asn
20 25 30

Val Lys Asp Cys Thr Ile Asp Phe Ser Lys Ser Val Ser Val Pro Arg
35 40 45

Gln Gln Glu Glu Phe Phe Thr Pro Val Ile Arg Thr Ala Ala Glu Arg
50 55 60

Pro Arg Ser Ala Gly Leu Leu Glu Asn Leu Val Ala Met Ile Lys Arg
65 70 75 80

Asn Phe Asn Ser Pro Asp Leu Thr Gly Ile Leu Asp Ile Glu Asp Thr
85 90 95

Ala Glu Leu Val Val Asn Lys Phe Trp Asp Ala Tyr Ile Ile Asp Glu
100 105 110

Leu Ser Gly Gly Asn Val Thr Pro Met Thr Ser Asp Ala Phe His Arg
115 120 125

Trp Met Ala Lys Gln Glu Lys Ser Thr Ile Arg Gln Leu Ala Asp Phe
130 135 140

Asp Phe Val Asp Leu Pro Ala Ile Asp Gln Tyr Lys His Met Ile Lys
145 150 155 160

Ala Gln Pro Lys Gln Lys Leu Asp Leu Ser Pro Gln Asp Glu Tyr Ala
165 170 175

Ala Leu Gln Thr Ile Val Tyr His Ser Lys Gln Ile Asn Ala Ile Phe
180 185 190

Gly Pro Leu Phe Ala Glu Leu Thr Arg Gln Leu Leu Glu Arg Ile Asp
195 200 205

NuCycle-0021.ST25.txt

Ser Ser Lys Phe Leu Phe Tyr Thr Arg Lys Thr Pro Glu Gln Ile Glu
210 215 220

Glu Phe Leu Ser Asp Leu Asp Ser Thr Val Pro Met Glu Ala Leu Val
225 230 235 240

Leu Asp Ile Ser Lys Tyr Asp Lys Ser Gln Asn Glu Phe His Cys Ala
245 250 255

Val Glu Tyr Phe Ile Trp Glu Lys Leu Gly Leu Asn Gly Phe Leu Glu
260 265 270

Glu Val Trp Lys Gln Gly His Arg Lys Thr Ser Leu Lys Asp Tyr Thr
275 280 285

Ala Gly Ile Lys Thr Cys Leu Trp Tyr Gln Arg Lys Ser Gly Asp Val
290 295 300

Thr Thr Phe Ile Gly Asn Thr Val Ile Ile Ala Ala Cys Leu Ala Ser
305 310 315 320

Met Ile Pro Met Asp Lys Val Ile Lys Ala Ala Phe Cys Gly Asp Asp
325 330 335

Ser Ile Leu Asp Ile Pro Lys Gly Leu Asp Leu Pro Asp Ile Gln Ser
340 345 350

Glu Ala Asn Leu Met Trp Asn Phe Glu Ala Lys Leu Tyr Arg Lys Arg
355 360 365

Tyr Gly Tyr Phe Cys Ala Arg Tyr Ile Ile His His Asp Arg Gly Ala
370 375 380

Ile Val Tyr Tyr Asp Pro Leu Lys Leu Ile Ser Lys Leu Gly Cys Lys
385 390 395 400

His Ile Lys Ser Leu Asp His Leu Glu Glu Phe Arg Met Ser Leu Cys
405 410 415

Asp Val Ser Ser Ser Leu Asn Asn Cys Ala Leu Phe Gly Gln Leu Asn
420 425 430

Asp Ala Ile Ala Glu Val His Lys Thr Ala Val Asn Gly Ser Phe Ala
435 440 445

Phe Cys Ser Ile Val Lys Tyr Leu Ser Asp
450 455

NuCycle-0021.ST25.txt

<210> 41
 <211> 466
 <212> PRT
 <213> Tobamovirus/ORSV

<400> 41

Met Gln Phe Tyr Tyr Asp Ala Leu Leu Pro Gly Asn Ser Thr Ile Leu
 1 5 10 15

Asn Glu Phe Asp Ala Val Thr Met Asn Leu Arg Asp Ile Ser Leu Asn
 20 25 30

Val Lys Asp Cys Arg Ile Asp Phe Ser Lys Ser Val Gln Leu Pro Lys
 35 40 45

Glu Gln Pro Ile Phe Leu Lys Pro Lys Ile Arg Thr Ala Ala Glu Met
 50 55 60

Pro Arg Thr Ala Gly Leu Leu Glu Asn Leu Val Ala Met Ile Lys Arg
 65 70 75 80

Asn Met Asn Ala Pro Asp Leu Thr Gly Thr Ile Asp Ile Glu Asp Thr
 85 90 95

Ala Ser Leu Val Val Glu Lys Phe Trp Asp Ser Tyr Val Asp Lys Glu
 100 105 110

Phe Ser Gly Thr Asn Glu Met Thr Met Thr Arg Glu Ser Phe Ser Arg
 115 120 125

Trp Leu Ser Lys Gln Glu Ser Ser Thr Val Gly Gln Leu Ala Asp Phe
 130 135 140

Asn Phe Val Asp Leu Pro Ala Val Asp Glu Tyr Lys His Met Ile Lys
 145 150 155 160

Ser Gln Pro Lys Gln Lys Leu Asp Leu Ser Ile Gln Asp Glu Tyr Pro
 165 170 175

Ala Leu Gln Thr Ile Val Tyr His Ser Lys Lys Ile Asn Ala Ile Phe
 180 185 190

Gly Pro Met Phe Ser Glu Leu Thr Arg Met Leu Leu Glu Arg Ile Asp
 195 200 205

Ser Ser Lys Phe Leu Phe Tyr Thr Arg Lys Thr Pro Ala Gln Ile Glu
 210 215 220

NuCycle-0021.ST25.txt

Asp Phe Phe Ser Asp Leu Asp Ser Thr Gln Ala Met Glu Ile Leu Glu
225 230 235 240

Leu Asp Ile Ser Lys Tyr Asp Lys Ser Gln Asn Glu Phe His Cys Ala
245 250 255

Val Glu Tyr Lys Ile Trp Glu Lys Leu Gly Ile Asp Glu Trp Leu Ala
260 265 270

Glu Val Trp Lys Gln Gly His Arg Lys Thr Thr Leu Lys Asp Tyr Thr
275 280 285

Ala Gly Val Lys Thr Cys Leu Trp Tyr Gln Arg Lys Ser Gly Asp Val
290 295 300

Thr Thr Phe Ile Gly Asn Thr Ile Ile Ile Ala Ala Cys Leu Ser Ser
305 310 315 320

Met Ile Pro Met Asp Lys Val Ile Lys Ala Ala Phe Cys Gly Asp Asp
325 330 335

Ser Leu Ile Tyr Ile Pro Lys Gly Leu Asp Leu Pro Asp Ile Gln Ala
340 345 350

Gly Ala Asn Leu Met Trp Asn Phe Glu Ala Lys Leu Phe Arg Lys Lys
355 360 365

Tyr Gly Tyr Phe Cys Gly Arg Tyr Val Ile His His Asp Arg Gly Ala
370 375 380

Ile Val Tyr Tyr Asp Pro Leu Lys Leu Ile Ser Lys Leu Gly Cys Lys
385 390 395 400

His Ile Arg Asp Val Val His Leu Glu Glu Leu Arg Glu Ser Leu Cys
405 410 415

Asp Val Ala Ser Asn Leu Asn Asn Cys Ala Tyr Phe Ser Gln Leu Asp
420 425 430

Glu Ala Val Ala Glu Val His Lys Thr Ala Val Gly Gly Ser Phe Ala
435 440 445

Phe Cys Ser Ile Ile Lys Tyr Leu Ser Asp Lys Arg Leu Phe Arg Asp
450 455 460

Leu Phe

NuCycle-0021.ST25.txt

465

<210> 42
 <211> 466
 <212> PRT
 <213> Tobamovirus/TVCV

<400> 42

Met Gln Phe Tyr Asn Asp Thr Leu Leu Pro Gly Asn Ser Thr Ile Leu
 1 5 10 15

Asn Glu Tyr Asp Ala Val Thr Met Asn Leu Arg Asp Ile Ser Leu Asn
 20 25 30

Val Lys Asp Cys Arg Ile Asp Phe Ser Lys Ser Val Gln Leu Pro Lys
 35 40 45

Glu Gln Pro Ile Phe Leu Lys Pro Lys Ile Arg Thr Ala Ala Glu Met
 50 55 60

Pro Arg Thr Ala Gly Leu Leu Glu Asn Leu Val Ala Met Ile Lys Arg
 65 70 75 80

Asn Met Asn Ala Pro Asp Leu Thr Gly Thr Ile Asp Ile Glu Asp Thr
 85 90 95

Ala Ser Leu Val Val Glu Lys Phe Trp Asp Ser Tyr Ile Asp Lys Glu
 100 105 110

Phe Ser Gly Thr Asn Glu Met Thr Met Thr Arg Glu Ser Phe Ser Arg
 115 120 125

Trp Leu Ser Lys Gln Glu Ser Ser Thr Val Gly Gln Leu Ala Asp Phe
 130 135 140

Asn Phe Val Asp Leu Pro Ala Val Asp Glu Tyr Lys His Met Ile Lys
 145 150 155 160

Ser Gln Pro Lys Gln Lys Leu Asp Leu Ser Ile Gln Asp Glu Tyr Pro
 165 170 175

Ala Leu Gln Thr Ile Val Tyr His Ser Lys Lys Ile Asn Ala Ile Phe
 180 185 190

Gly Pro Met Phe Ser Glu Leu Thr Arg Met Leu Leu Glu Arg Ile Asp
 195 200 205

Ser Ser Lys Phe Leu Phe Tyr Thr Arg Lys Thr Pro Ala Gln Ile Glu
 Page 53

NuCycle-0021.ST25.txt
220

210

215

Asp Phe Phe Ser Asp Leu Asp Ser Thr Gln Ala Met Glu Ile Leu Glu
225 230 235 240

Leu Asp Ile Ser Lys Tyr Asp Lys Ser Gln Asn Glu Phe His Cys Ala
245 250 255

Val Glu Tyr Lys Ile Trp Glu Lys Leu Gly Ile Asp Glu Trp Leu Ala
260 265 270

Glu Val Trp Lys Gln Gly His Arg Lys Thr Thr Leu Lys Asp Tyr Thr
275 280 285

Ala Gly Ile Lys Thr Cys Leu Trp Tyr Gln Arg Lys Ser Gly Asp Val
290 295 300

Thr Thr Phe Ile Gly Asn Thr Ile Ile Ile Ala Ala Cys Leu Ser Ser
305 310 315 320

Met Ile Pro Met Asp Lys Val Ile Lys Ala Ala Phe Cys Gly Asp Asp
325 330 335

Ser Leu Ile Tyr Ile Pro Lys Gly Leu Asp Leu Pro Asp Ile Gln Ala
340 345 350

Gly Ala Asn Leu Met Trp Asn Phe Glu Ala Lys Leu Phe Arg Lys Lys
355 360 365

Tyr Gly Tyr Phe Cys Gly Arg Tyr Val Ile His His Asp Arg Gly Ala
370 375 380

Ile Val Tyr Tyr Asp Pro Leu Lys Leu Ile Ser Lys Leu Gly Cys Lys
385 390 395 400

His Ile Arg Asp Val Val His Leu Glu Glu Leu Arg Glu Ser Leu Cys
405 410 415

Asp Val Ala Ser Asn Leu Asn Asn Cys Ala Tyr Phe Ser Gln Leu Asp
420 425 430

Glu Ala Val Ala Glu Val His Lys Thr Ala Val Gly Gly Ser Phe Ala
435 440 445

Phe Cys Ser Ile Ile Lys Tyr Leu Ser Asp Lys Arg Leu Phe Arg Asp
450 455 460

NuCycle-0021.ST25.txt

Leu Phe
465

<210> 43
<211> 466
<212> PRT
<213> Tobamovirus/CR-TMV

<400> 43

Met Gln Phe Tyr Asn Asp Thr Leu Leu Pro Gly Asn Ser Thr Ile Leu
1 5 10 15

Asn Glu Tyr Asp Ala Val Thr Met Asn Leu Arg Asp Ile Ser Leu Asn
20 25 30

Val Lys Asp Cys Arg Ile Asp Phe Ser Lys Ser Val Gln Leu Pro Lys
35 40 45

Glu Gln Pro Ile Phe Leu Lys Pro Lys Ile Arg Thr Ala Ala Glu Met
50 55 60

Pro Arg Thr Ala Gly Leu Leu Glu Asn Leu Val Ala Met Ile Lys Arg
65 70 75 80

Asn Met Asn Ala Pro Asp Leu Thr Gly Thr Ile Asp Ile Glu Asp Thr
85 90 95

Ala Ser Leu Val Val Glu Lys Phe Trp Asp Ser Tyr Ile Asp Lys Glu
100 105 110

Phe Ser Gly Thr Asn Glu Met Thr Met Thr Arg Glu Ser Phe Ser Arg
115 120 125

Trp Leu Ser Lys Gln Glu Ser Ser Thr Val Gly Gln Leu Ala Asp Phe
130 135 140

Asn Phe Val Asp Leu Pro Ala Val Asp Glu Tyr Lys His Met Ile Lys
145 150 155 160

Ser Gln Pro Lys Gln Lys Leu Asp Leu Ser Ile Gln Asp Glu Tyr Pro
165 170 175

Ala Leu Gln Thr Ile Val Tyr His Ser Lys Lys Ile Asn Ala Ile Phe
180 185 190

Gly Pro Met Phe Ser Glu Leu Thr Arg Met Leu Leu Glu Arg Ile Asp
195 200 205

NuCycle-0021.ST25.txt

Ser Ser Lys Phe Leu Phe Tyr Thr Arg Lys Thr Pro Ala Gln Ile Glu
210 215 220

Asp Phe Phe Ser Asp Leu Asp Ser Thr Gln Ala Met Glu Ile Leu Glu
225 230 235 240

Leu Asp Ile Ser Lys Tyr Asp Lys Ser Gln Asn Glu Phe His Cys Ala
245 250 255

Val Glu Tyr Lys Ile Trp Glu Lys Leu Gly Ile Asp Glu Trp Leu Ala
260 265 270

Glu Val Trp Lys Gln Gly His Arg Lys Thr Thr Leu Lys Asp Tyr Thr
275 280 285

Ala Gly Ile Lys Thr Cys Leu Trp Tyr Gln Arg Lys Ser Gly Asp Val
290 295 300

Thr Thr Phe Ile Gly Asn Thr Ile Ile Ile Ala Ala Cys Leu Ser Ser
305 310 315 320

Met Ile Pro Met Asp Lys Val Ile Lys Ala Ala Phe Cys Gly Asp Asp
325 330 335

Ser Leu Ile Tyr Ile Pro Lys Gly Leu Asp Leu Pro Asp Ile Gln Ala
340 345 350

Gly Ala Asn Leu Met Trp Asn Phe Glu Ala Lys Leu Phe Arg Lys Lys
355 360 365

Tyr Gly Tyr Phe Cys Gly Arg Tyr Val Ile His His Asp Arg Gly Ala
370 375 380

Ile Val Tyr Tyr Asp Pro Leu Lys Leu Ile Ser Lys Leu Gly Cys Lys
385 390 395 400

His Ile Arg Asp Val Val His Leu Glu Glu Leu Arg Glu Ser Leu Cys
405 410 415

Asp Val Ala Ser Asn Leu Asn Asn Cys Ala Tyr Phe Ser Gln Leu Asp
420 425 430

Glu Ala Val Ala Glu Val His Lys Thr Ala Val Gly Gly Ser Phe Ala
435 440 445

Phe Cys Ser Ile Ile Lys Tyr Leu Ser Asp Lys Arg Leu Phe Arg Asp
450 455 460

NuCycle-0021.ST25.txt

Leu Phe
465

<210> 44
<211> 466
<212> PRT
<213> Tobamovirus/RMV-SH

<400> 44

Met Gln Phe Tyr Tyr Asp Thr Leu Leu Pro Gly Asn Ser Thr Ile Leu
1 5 10 15

Asn Glu Phe Asp Ala Val Thr Met Asn Leu Arg Asp Ile Ser Leu Asn
20 25 30

Val Lys Asp Cys Arg Ile Asp Phe Ser Lys Ser Val Gln Val Pro Lys
35 40 45

Glu Arg Pro Val Phe Met Lys Pro Lys Leu Arg Thr Ala Ala Glu Met
50 55 60

Pro Arg Thr Ala Gly Leu Leu Glu Asn Leu Val Ala Met Ile Lys Arg
65 70 75 80

Asn Met Asn Ala Pro Asp Leu Thr Gly Thr Ile Asp Ile Glu Asp Thr
85 90 95

Ala Ser Leu Val Val Glu Lys Phe Trp Asp Ala Tyr Val Val Lys Glu
100 105 110

Phe Ser Gly Thr Asp Gly Met Ala Met Thr Arg Glu Ser Phe Ser Arg
115 120 125

Trp Leu Ser Lys Gln Glu Ser Ser Thr Val Gly Gln Leu Ala Asp Phe
130 135 140

Asn Phe Val Asp Leu Pro Ala Val Asp Glu Tyr Lys His Met Ile Lys
145 150 155 160

Ser Gln Pro Lys Gln Lys Leu Asp Leu Ser Ile Gln Asp Glu Tyr Pro
165 170 175

Ala Leu Gln Thr Ile Val Tyr His Ser Lys Lys Ile Asn Ala Ile Phe
180 185 190

Gly Pro Met Phe Ser Glu Leu Thr Arg Met Leu Leu Glu Arg Ile Asp
195 200 205

NuCycle-0021.ST25.txt

Thr Ser Lys Phe Leu Phe Tyr Thr Arg Lys Thr Pro Thr Gln Ile Glu
 210 215 220
 Glu Phe Phe Ser Asp Leu Asp Ser Ser Gln Ala Met Glu Ile Leu Glu
 225 230 235 240
 Leu Asp Ile Ser Lys Tyr Asp Lys Ser Gln Asn Glu Phe His Cys Ala
 245 250 255
 Val Glu Tyr Lys Ile Trp Glu Lys Leu Gly Ile Asp Glu Trp Leu Ala
 260 265 270
 Glu Val Trp Arg Gln Gly His Arg Lys Thr Thr Leu Lys Asp Tyr Thr
 275 280 285
 Ala Gly Ile Lys Thr Cys Leu Trp Tyr Gln Arg Lys Ser Gly Asp Val
 290 295 300
 Thr Thr Phe Ile Gly Asn Thr Ile Ile Ile Ala Ala Cys Leu Ser Ser
 305 310 315 320
 Met Ile Pro Met Asp Lys Val Ile Lys Ala Ala Phe Cys Gly Asp Asp
 325 330 335
 Ser Leu Ile Tyr Ile Pro Lys Gly Leu Asp Leu Pro Asp Ile Gln Ala
 340 345 350
 Gly Ala Asn Leu Thr Trp Asn Phe Glu Ala Lys Leu Phe Arg Lys Lys
 355 360 365
 Tyr Gly Tyr Phe Cys Gly Arg Tyr Val Ile His His Asp Arg Gly Ala
 370 375 380
 Ile Val Tyr Tyr Asp Pro Leu Lys Leu Ile Ser Lys Leu Gly Cys Lys
 385 390 395 400
 His Ile Arg Asp Glu Val His Leu Glu Glu Leu Arg Arg Ser Leu Cys
 405 410 415
 Asp Val Thr Ser Asn Leu Asn Asn Cys Ala Tyr Phe Ser Gln Leu Asp
 420 425 430
 Glu Ala Val Ala Glu Val His Lys Thr Ala Val Gly Gly Ala Phe Val
 435 440 445
 Tyr Cys Ser Ile Ile Lys Tyr Leu Ser Asp Lys Arg Leu Phe Lys Asp
 450 455 460

NuCycle-0021.ST25.txt

Leu Phe
465

<210> 45
<211> 466
<212> PRT
<213> Tobamovirus/CRMV

<400> 45

Met Gln Phe Tyr Tyr Asp Thr Leu Leu Pro Gly Asn Ser Thr Ile Leu
1 5 10 15

Asn Glu Phe Asp Ala Val Thr Met Asn Leu Arg Asp Ile Ser Leu Asn
20 25 30

Val Lys Asp Cys Arg Ile Asp Phe Ser Lys Ser Val Gln Val Pro Lys
35 40 45

Glu Arg Pro Val Phe Met Lys Pro Lys Leu Arg Thr Ala Ala Glu Met
50 55 60

Pro Arg Thr Ala Gly Leu Leu Glu Asn Leu Val Ala Met Ile Lys Arg
65 70 75 80

Asn Met Asn Ala Pro Asp Leu Thr Gly Thr Ile Asp Ile Glu Asp Thr
85 90 95

Ala Ser Leu Val Val Glu Lys Phe Trp Asp Ala Tyr Val Val Lys Glu
100 105 110

Phe Ser Gly Thr Asp Gly Met Ala Met Thr Arg Glu Ser Phe Ser Arg
115 120 125

Trp Leu Ser Lys Gln Glu Ser Ser Thr Val Gly Gln Leu Ala Asp Phe
130 135 140

Asn Phe Val Asp Leu Pro Ala Val Asp Glu Tyr Lys His Met Ile Lys
145 150 155 160

Ser Gln Pro Lys Gln Lys Leu Asp Leu Ser Ile Gln Asp Glu Tyr Pro
165 170 175

Ala Leu Gln Thr Ile Val Tyr His Ser Lys Lys Ile Asn Ala Ile Phe
180 185 190

Gly Pro Met Phe Ser Glu Leu Thr Arg Met Leu Leu Glu Thr Ile Asp
195 200 205

NuCycle-0021.ST25.txt

Thr Ser Lys Phe Leu Phe Tyr Thr Arg Lys Thr Pro Thr Gln Ile Glu
 210 215 220
 Glu Phe Phe Ser Asp Leu Asp Ser Ser Gln Ala Met Glu Ile Leu Glu
 225 230 235 240
 Leu Asp Ile Ser Lys Tyr Asp Lys Ser Gln Asn Glu Phe His Cys Ala
 245 250 255
 Val Glu Tyr Lys Ile Trp Glu Lys Leu Gly Ile Asp Asp Trp Leu Ala
 260 265 270
 Glu Val Trp Arg Gln Gly His Arg Lys Thr Thr Leu Lys Asp Tyr Thr
 275 280 285
 Ala Gly Ile Lys Thr Cys Leu Trp Tyr Gln Arg Lys Ser Gly Asp Val
 290 295 300
 Thr Thr Phe Ile Gly Asn Thr Ile Ile Ile Ala Ala Cys Leu Ser Ser
 305 310 315 320
 Met Ile Pro Met Asp Lys Val Ile Lys Ala Ala Phe Cys Gly Asp Asp
 325 330 335
 Ser Leu Ile Tyr Ile Pro Lys Gly Leu Asp Leu Pro Asp Ile Gln Ala
 340 345 350
 Gly Ala Asn Leu Thr Trp Asn Phe Glu Ala Lys Leu Phe Arg Lys Lys
 355 360 365
 Tyr Gly Tyr Phe Cys Gly Arg Tyr Val Ile His His Asp Arg Gly Ala
 370 375 380
 Ile Val Tyr Tyr Asp Pro Leu Lys Leu Ile Ser Lys Leu Gly Cys Lys
 385 390 395 400
 His Ile Arg Asp Glu Val His Leu Glu Glu Leu Arg Arg Ser Leu Cys
 405 410 415
 Asp Val Thr Ser Asn Leu Asn Asn Cys Ala Tyr Phe Ser Gln Leu Asp
 420 425 430
 Glu Ala Val Ala Glu Val His Lys Thr Ala Val Gly Gly Ala Phe Val
 435 440 445
 Tyr Cys Ser Ile Ile Lys Tyr Leu Ser Asp Lys Arg Leu Phe Lys Asp
 Page 60

450

455

Leu Phe
465

<210> 46
<211> 417
<212> PRT
<213> Tobamovirus/TMV-CG

<400> 46

Met Gln Phe Tyr Tyr Asp Thr Leu Leu Pro Gly Asn Ser Thr Ile Leu
1 5 10 15

Asn Glu Phe Asp Ala Val Thr Met Asn Leu Arg Asp Ile Ser Leu Asn
20 25 30

Val Lys Asp Cys Arg Ile Asp Phe Ser Lys Ser Val Gln Leu Pro Arg
35 40 45

Glu Arg Pro Ile Phe Met Lys Pro Lys Leu Arg Thr Ala Ala Glu Met
50 55 60

Pro Arg Thr Ala Gly Leu Leu Glu Asn Leu Val Ala Met Ile Lys Arg
65 70 75 80

Asn Met Asn Ala Pro Asp Leu Thr Gly Thr Ile Asp Ile Glu Asp Thr
85 90 95

Ala Ser Leu Val Val Glu Lys Phe Trp Asp Ala Tyr Val Val Lys Glu
100 105 110

Phe Ser Gly Thr Asp Gly Met Ala Met Thr Arg Glu Ser Phe Ser Arg
115 120 125

Trp Leu Ser Lys Gln Glu Ser Ser Thr Val Gly Gln Leu Ala Asp Phe
130 135 140

Asn Phe Val Asp Leu Pro Ala Val Asp Glu Tyr Lys His Met Ile Lys
145 150 155 160

Ser Gln Pro Lys Gln Lys Leu Asp Leu Ser Ile Gln Asp Glu Tyr Pro
165 170 175

Ala Leu Gln Thr Ile Val Tyr His Ser Lys Lys Ile Asn Ala Ile Phe
180 185 190

Gly Pro Met Phe Ser Glu Leu Thr Arg Met Leu Leu Glu Arg Ile Asp
Page 61

195

200

205

Thr Ser Lys Phe Leu Phe Tyr Thr Arg Lys Thr Pro Thr Gln Ile Glu
 210 215 220

Glu Phe Phe Ser Asp Leu Asp Ser Ser Gln Ala Met Glu Ile Leu Glu
 225 230 235 240

Leu Asp Ile Ser Lys Tyr Asp Lys Ser Gln Asn Glu Phe His Cys Ala
 245 250 255

Val Glu Tyr Lys Ile Trp Glu Lys Leu Gly Ile Asp Asp Trp Leu Ala
 260 265 270

Glu Val Trp Arg Gln Gly His Arg Lys Thr Thr Leu Lys Asp Tyr Thr
 275 280 285

Ala Gly Ile Lys Thr Cys Leu Trp Tyr Gln Arg Lys Ser Gly Asp Val
 290 295 300

Thr Thr Phe Ile Gly Asn Thr Ile Ile Ile Ala Ala Cys Leu Ser Ser
 305 310 315 320

Met Ile Pro Met Asp Lys Val Ile Lys Ala Ala Phe Cys Gly Asp Asp
 325 330 335

Ser Leu Ile Tyr Ile Pro Lys Gly Leu Asp Leu Pro Asp Ile Gln Ala
 340 345 350

Gly Ala Asn Leu Thr Trp Asn Phe Glu Ala Lys Leu Phe Arg Lys Lys
 355 360 365

Tyr Gly Tyr Phe Cys Gly Arg Tyr Val Ile His His Asp Arg Gly Ala
 370 375 380

Ile Val Tyr Tyr Asp Pro Leu Lys Leu Ile Ser Lys Leu Gly Cys Lys
 385 390 395 400

His Ile Arg Asp Glu Val His Leu Glu Glu Leu Arg Arg Ser Leu Cys
 405 410 415

Asp

<210> 47
 <211> 426
 <212> PRT
 <213> Tobamovirus/TMV-OB

NuCycle-0021.ST25.txt

<400> 47

Gln Asp Leu Gln Phe Tyr Tyr Asp Lys Cys Leu Pro Gly Asn Ser Thr
1 5 10 15

Val Leu Asn Glu Phe Asp Ala Val Thr Met Asn Cys Ser Asp Ile Ser
20 25 30

Leu Asn Val Lys Asp Cys Val Leu Asp Phe Ser Lys Ser Val Pro Leu
35 40 45

Pro Arg Asp Asn Thr Lys Val Pro Met Thr Pro Val Ile Arg Thr Ala
50 55 60

Ala Glu Arg Pro Arg Ser Gln Gly Leu Leu Glu Asn Leu Val Ala Met
65 70 75 80

Ile Lys Arg Asn Phe Asn Ser Pro Glu Leu Ser Gly Thr Val Asp Met
85 90 95

Glu Asn Thr Ala Ser Val Val Ala Asp Arg Phe Phe Asp Ser Tyr Phe
100 105 110

Leu Lys Asp Lys Leu Ser Gly Cys Ser Leu Gly Asp Ser Gly Gly Lys
115 120 125

Asn Ile Ile Asp Arg Gln Ala Leu Ile Arg Trp Met Glu Lys Gln Glu
130 135 140

Lys Ser Thr Ile Gly Gln Leu Ala Asp Tyr Asp Phe Val Asp Leu Pro
145 150 155 160

Ala Ile Asp Gln Tyr Arg His Ile Ile Lys Ser Gln Pro Lys Gln Lys
165 170 175

Leu Asp Leu Ser Ile Gln Ser Glu Tyr Pro Ser Leu Gln Thr Ile Val
180 185 190

Tyr His Ser Lys Lys Ile Asn Ala Leu Phe Gly Pro Ile Phe Ser Glu
195 200 205

Leu Thr Arg Gln Met Leu Ser Ala Ile Asp Thr Ser Arg Tyr Leu Phe
210 215 220

Phe Thr Arg Lys Thr Pro Glu Gln Ile Glu Glu Phe Phe Ser Asp Leu
225 230 235 240

NuCycle-0021.ST25.txt

Asp Ala Thr Leu Lys Asp Tyr Thr Ala Gly Ile Lys Thr Cys Leu Trp
245 250 255

Tyr Gln Arg Lys Ser Gly Asp Val Thr Thr Phe Ile Gly Asn Thr Val
260 265 270

Ile Ile Ala Ala Cys Met Ala Ser Met Leu Pro Met Glu Lys Val Ile
275 280 285

Lys Ala Ala Phe Cys Gly Asp Asp Ser Leu Val Tyr Leu Pro Lys Gly
290 295 300

Cys Glu Leu Pro Asn Ile Gln Ser Cys Ala Asn Leu Met Trp Asn Phe
305 310 315 320

Glu Ala Lys Leu Phe Lys Lys Thr Tyr Gly Tyr Phe Cys Gly Arg Tyr
325 330 335

Val Ile His His Asp Arg Gly Ala Ile Val Tyr Val Asp Pro Leu Lys
340 345 350

Ile Ile Ser Lys Leu Gly Ala Lys His Ile Thr Asp Lys Glu His Leu
355 360 365

Glu Glu Phe Arg Ile Ser Leu Ala Asp Val Ser Lys Ser Leu Asn Asn
370 375 380

Cys Ala Tyr Tyr Ala Gln Leu Asp Glu Ala Val Arg Glu Val His Lys
385 390 395 400

Thr Ala Pro Pro Gly Ser Phe Val Tyr Lys Cys Ile Val Lys Phe Leu
405 410 415

Ser Asn Arg Val Leu Phe Glu Ser Leu Phe
420 425

<210> 48
<211> 473
<212> PRT
<213> Tobamovirus/CGMMV

<400> 48

Met Gln Glu Phe Tyr Asp Arg Cys Leu Pro Gly Asn Ser Phe Val Leu
1 5 10 15

Asn Asp Phe Asp Ala Val Thr Met Arg Leu Arg Asp Asn Glu Phe Asn
20 25 30

NuCycle-0021.ST25.txt

Leu Gln Pro Cys Arg Leu Thr Leu Ser Asn Leu Asp Pro Val Pro Ala
 35 40 45
 Leu Ile Lys Asn Glu Ala Gln Asn Phe Leu Ile Pro Val Leu Arg Thr
 50 55 60
 Ala Cys Glu Arg Pro Arg Ile Pro Gly Leu Leu Glu Asn Leu Val Ala
 65 70 75 80
 Met Ile Lys Arg Asn Met Asn Thr Pro Asp Leu Ala Gly Thr Val Asp
 85 90 95
 Ile Thr Asn Met Ser Ile Ser Ile Val Asp Asn Phe Phe Ser Ser Phe
 100 105 110
 Val Arg Asp Glu Val Leu Leu Asp His Leu Asp Cys Val Arg Ala Ser
 115 120 125
 Ser Ile Gln Ser Phe Ser Asp Trp Phe Ser Cys Gln Pro Thr Ser Ala
 130 135 140
 Val Gly Gln Leu Ala Asn Phe Asn Phe Ile Asp Leu Pro Ala Phe Asp
 145 150 155 160
 Thr Tyr Met His Met Ile Lys Arg Gln Pro Lys Ser Arg Leu Asp Thr
 165 170 175
 Ser Ile Gln Ser Glu Tyr Pro Ala Leu Gln Thr Ile Val Tyr His Pro
 180 185 190
 Lys Val Val Asn Ala Val Phe Gly Pro Val Phe Lys Tyr Leu Thr Thr
 195 200 205
 Lys Phe Leu Ser Met Val Asp Ser Ser Lys Phe Phe Phe Tyr Thr Arg
 210 215 220
 Lys Lys Pro Glu Asp Leu Gln Glu Phe Phe Ser Asp Leu Ser Ser His
 225 230 235 240
 Ser Asp Tyr Glu Ile Leu Glu Leu Asp Val Ser Lys Tyr Asp Lys Ser
 245 250 255
 Gln Ser Asp Phe His Phe Ser Ile Glu Met Ala Ile Trp Glu Lys Leu
 260 265 270
 Gly Leu Asp Asp Ile Leu Ala Trp Met Trp Ser Met Gly His Lys Arg
 275 280 285

NuCycle-0021.ST25.txt

Thr Ile Leu Gln Asp Phe Gln Ala Gly Ile Lys Thr Leu Ile Tyr Tyr
290 295 300

Gln Arg Lys Ser Gly Asp Val Thr Thr Phe Ile Gly Asn Thr Phe Ile
305 310 315 320

Ile Ala Ala Cys Val Ala Ser Met Leu Pro Leu Asp Lys Cys Phe Lys
325 330 335

Ala Ser Phe Cys Gly Asp Asp Ser Leu Ile Tyr Leu Pro Lys Gly Leu
340 345 350

Glu Tyr Pro Asp Ile Gln Ala Thr Ala Asn Leu Val Trp Asn Phe Glu
355 360 365

Ala Lys Leu Phe Arg Lys Lys Tyr Gly Tyr Phe Cys Gly Lys Tyr Ile
370 375 380

Ile His His Ala Asn Gly Cys Ile Val Tyr Pro Asp Pro Leu Lys Leu
385 390 395 400

Ile Ser Lys Leu Gly Asn Lys Ser Leu Val Gly Tyr Glu His Val Glu
405 410 415

Glu Phe Arg Ile Ser Leu Leu Asp Val Ala His Ser Leu Phe Asn Gly
420 425 430

Ala Tyr Phe His Leu Leu Asp Asp Ala Ile His Glu Leu Phe Pro Asn
435 440 445

Ala Gly Gly Cys Ser Phe Val Ile Asn Cys Leu Cys Lys Tyr Leu Ser
450 455 460

Asp Lys Arg Leu Phe Arg Ser Leu Tyr
465 470

<210> 49
<211> 475
<212> PRT
<213> Tobamovirus/CGMMV-W

<400> 49

Thr Asp Met Gln Glu Phe Tyr Asp Arg Cys Leu Pro Gly Asn Ser Phe
1 5 10 15

Val Leu Asn Asp Phe Asp Ala Val Thr Met Arg Leu Arg Asp Asn Glu
20 25 30

NuCycle-0021.ST25.txt

Phe Asn Leu Gln Pro Cys Arg Leu Thr Leu Ser Asn Leu Asp Pro Val
 35 40 45
 Pro Ala Leu Val Lys Ser Glu Ala Gln Asn Phe Leu Ile Pro Val Leu
 50 55 60
 Arg Thr Ala Cys Glu Arg Pro Arg Ile Pro Gly Leu Leu Glu Asn Leu
 65 70 75 80
 Val Ala Met Ile Lys Arg Asn Met Asn Thr Pro Asp Leu Ala Gly Thr
 85 90 95
 Val Asp Ile Thr Asn Met Ser Ile Ser Ile Val Asp Asn Phe Phe Ser
 100 105 110
 Ser Phe Val Arg Asp Glu Val Leu Leu Asp His Leu Asp Cys Val Arg
 115 120 125
 Ala Ser Ser Ile Gln Ser Phe Ser Asp Trp Phe Ser Cys Gln Pro Thr
 130 135 140
 Ser Ala Val Gly Gln Leu Ala Asn Phe Asn Phe Ile Asp Leu Pro Ala
 145 150 155 160
 Phe Asp Thr Tyr Met His Met Ile Lys Arg Gln Pro Lys Ser Arg Leu
 165 170 175
 Asp Thr Ser Ile Gln Ser Glu Tyr Pro Ala Leu Gln Thr Ile Val Tyr
 180 185 190
 His Pro Lys Val Val Asn Ala Val Phe Gly Pro Val Phe Lys Tyr Leu
 195 200 205
 Thr Thr Lys Phe Leu Ser Met Val Asp Ser Ser Lys Phe Phe Phe Tyr
 210 215 220
 Thr Arg Lys Lys Pro Glu Asp Leu Gln Glu Phe Phe Ser Asp Leu Ser
 225 230 235 240
 Ser His Ser Asp Tyr Glu Ile Leu Glu Leu Asp Val Ser Lys Tyr Asp
 245 250 255
 Lys Ser Gln Ser Asp Phe His Phe Ser Ile Glu Met Ala Ile Trp Glu
 260 265 270
 Lys Leu Gly Leu Asp Asp Ile Leu Ala Trp Met Trp Ser Met Gly His
 275 280 285

NuCycle-0021.ST25.txt

Lys Arg Thr Ile Leu Gln Asp Phe Gln Ala Gly Ile Lys Thr Leu Ile
290 295 300

Tyr Tyr Gln Arg Lys Ser Gly Asp Val Thr Thr Phe Ile Gly Asn Thr
305 310 315 320

Phe Ile Ile Ala Ala Cys Val Ala Ser Met Leu Pro Leu Asp Lys Cys
325 330 335

Phe Lys Ala Ser Phe Cys Gly Asp Asp Ser Leu Ile Tyr Leu Pro Lys
340 345 350

Gly Leu Glu Tyr Pro Asp Ile Gln Ala Thr Ala Asn Leu Val Trp Asn
355 360 365

Phe Glu Ala Lys Leu Phe Arg Lys Lys Tyr Gly Tyr Phe Cys Gly Lys
370 375 380

Tyr Ile Ile His His Ala Asn Gly Cys Ile Val Tyr Pro Asp Pro Leu
385 390 395 400

Lys Leu Ile Ser Lys Leu Gly Asn Lys Ser Leu Val Gly Tyr Glu His
405 410 415

Val Glu Glu Phe Arg Ile Ser Leu Leu Asp Val Ala His Ser Leu Phe
420 425 430

Asn Gly Ala Tyr Phe His Leu Leu Asp Asp Ala Ile His Glu Leu Phe
435 440 445

Pro Asn Ala Gly Gly Cys Ser Phe Val Ile Asn Cys Leu Cys Lys Tyr
450 455 460

Leu Ser Asp Lys Arg Leu Phe Arg Ser Leu Tyr
465 470 475

<210> 50
<211> 473
<212> PRT
<213> Tobamovirus/CFMMV

<400> 50

Met Gln Asn Phe Tyr Asp Ala Cys Leu Pro Gly Asn Ser Phe Val Leu
1 5 10 15

Asn Asp Tyr Asp Ser Val Thr Met Arg Leu Val Asp Asn Glu Ile Asn
20 25 30

NuCycle-0021.ST25.txt

Leu Gln Pro Cys Arg Leu Thr Leu Ser Lys Ala Asp Pro Val Thr Glu
 35 40 45
 Ser Leu Lys Met Glu Lys Lys Glu Phe Leu Ile Pro Leu Gly Lys Thr
 50 55 60
 Ala Thr Glu Arg Pro Arg Ile Pro Gly Leu Leu Glu Asn Leu Ile Ala
 65 70 75 80
 Ile Val Lys Arg Asn Phe Asn Thr Pro Asp Leu Ala Gly Ser Leu Asp
 85 90 95
 Ile Ser Ser Ile Ser Lys Gly Val Val Asp Asn Phe Phe Ser Thr Phe
 100 105 110
 Leu Arg Asp Glu Gln Leu Ala Asp His Leu Cys Lys Val Arg Ser Leu
 115 120 125
 Ser Leu Glu Ser Phe Ser Ala Trp Phe Asp Asn Gln Ser Thr Cys Ala
 130 135 140
 Leu Gly Gln Leu Ser Asn Phe Asp Phe Val Asp Leu Pro Pro Val Asp
 145 150 155 160
 Val Tyr Asn His Met Ile Lys Arg Gln Pro Lys Ser Lys Leu Asp Thr
 165 170 175
 Ser Ile Gln Ser Glu Tyr Pro Ala Leu Gln Thr Ile Val Tyr His Ser
 180 185 190
 Lys Leu Val Asn Ala Val Phe Gly Pro Val Phe Arg Tyr Leu Thr Ser
 195 200 205
 Glu Phe Leu Ser Met Val Asp Asn Ser Lys Phe Phe Phe Tyr Thr Arg
 210 215 220
 Lys Leu Arg Met Ile Cys Lys Phe Leu Phe Pro His Phe Pro Asn Lys
 225 230 235 240
 Gln Glu Tyr Glu Ile Leu Glu Leu Asp Val Ser Lys Tyr Asp Lys Ser
 245 250 255
 Gln Asn Asp Phe His Gln Ala Val Glu Met Leu Ile Trp Glu Arg Leu
 260 265 270
 Gly Leu Asp Asp Ile Leu Ala Arg Ile Trp Glu Met Gly His Lys Lys
 Page 69

275

280

285

Thr His Ile Ser Asp Phe Gln Ala Gly Ile Lys Thr Leu Ile Tyr Tyr
 290 295 300

Gln Arg Lys Ser Gly Asp Val Thr Thr Phe Ile Gly Asn Thr Phe Ile
 305 310 315 320

Ile Ala Ala Cys Val Ala Ser Met Val Pro Leu Ser Arg Ser Phe Lys
 325 330 335

Ala Ala Phe Cys Gly Asp Asp Ser Leu Ile Tyr Met Pro Pro Asn Leu
 340 345 350

Glu Tyr Asn Asp Ile Gln Ser Thr Ala Asn Leu Val Trp Asn Phe Glu
 355 360 365

Ala Lys Leu Tyr Lys Lys Lys Tyr Gly Tyr Phe Cys Gly Lys Tyr Val
 370 375 380

Ile His His Ala Asn Gly Cys Ile Val Tyr Pro Asp Pro Leu Lys Leu
 385 390 395 400

Ile Ser Lys Leu Gly Asn Lys Ser Leu Glu Ser Tyr Asp His Leu Glu
 405 410 415

Glu Phe Arg Ile Ser Leu Met Asp Val Ala Lys Pro Leu Phe Asn Ala
 420 425 430

Ala Tyr Phe His Leu Leu Asp Asp Ala Ile His Glu Tyr Phe Pro Ser
 435 440 445

Val Gly Gly Ser Thr Phe Ala Ile Ser Ser Leu Cys Lys Tyr Leu Ser
 450 455 460

Asn Lys Gln Leu Phe Gly Ser Leu Phe
 465 470

<210> 51

<211> 475

<212> PRT

<213> Tobamovirus/YCGMMV

<400> 51

Thr Asp Met Gln Ser Phe Tyr Asp Ala Cys Leu Pro Gly Asn Ser Phe
 1 5 10 15

Val Leu Asn Asp Tyr Asp Ser Val Thr Met Arg Leu Ala Asp Asn Glu
 Page 70

Phe Asn Leu Gln Pro Cys Arg Leu Thr Leu Ser Lys Ala Asp Pro Val
35 40 45

Ala Glu Ser Ile Lys Leu Glu Arg Lys Asn Ile Asp Lys Leu Asp Leu
50 55 60

Lys Thr Ala Thr Glu Arg Pro Arg Ile Pro Gly Phe Leu Glu Asn Leu
65 70 75 80

Val Ala Ile Val Lys Arg Asn Phe Asn Thr Pro Asp Leu Ala Gly Val
85 90 95

Leu Asp Ile Asp Thr Ile Ser Lys Ser Val Val Asp Asn Phe Phe Thr
100 105 110

Thr Phe Leu Arg Asp Glu Gln Leu Ser Asp His Leu Val Arg Val Arg
115 120 125

Ser Cys Ser Leu Glu Ser Phe Ser Ala Trp Phe His Asn Gln Ala Thr
130 135 140

Ala Ala Met Gly Gln Leu Ala Asn Phe Asp Phe Ser Asp Leu Pro Pro
145 150 155 160

Val Asp Met Tyr Thr His Met Ile Lys Arg Gln Pro Lys Ser Lys Leu
165 170 175

Asp Thr Ser Ile Gln Ser Glu Tyr Pro Ala Leu Gln Thr Ile Val Tyr
180 185 190

His Ser Lys Leu Val Asn Ala Val Phe Gly Pro Val Phe Arg Tyr Leu
195 200 205

Thr Ser Glu Phe Leu Ser Met Val Asp Asn Ser Lys Phe Phe Phe Tyr
210 215 220

Thr Arg Lys Thr Pro Glu Asp Leu Gln Ser Phe Phe Ser Thr Leu Ser
225 230 235 240

Ala Lys Glu Ser Tyr Glu Ile Leu Glu Leu Asp Val Ser Lys Tyr Asp
245 250 255

Lys Ser Gln Thr Asp Phe His Gln Ala Val Glu Met Leu Ile Trp Glu
260 265 270

NuCycle-0021.ST25.txt

Arg Leu Gly Leu Asp Asp Val Leu Ala Arg Ile Trp Glu Met Gly His
275 280 285

Lys Lys Thr Ser Ile Ser Asp Phe Gln Ala Gly Ile Lys Thr Val Ile
290 295 300

Tyr Tyr Gln Arg Lys Ser Gly Asp Val Thr Thr Phe Ile Gly Asn Thr
305 310 315 320

Phe Ile Ile Ala Ala Cys Val Ala Ser Met Ile Pro Leu Ser Arg Ser
325 330 335

Phe Lys Ala Ser Phe Cys Gly Asp Asp Ser Leu Ile Tyr Met Pro Pro
340 345 350

Gly Leu Glu Tyr Pro Asp Ile Gln Ala Thr Ala Asn Leu Val Trp Asn
355 360 365

Phe Glu Ala Lys Leu Phe Lys Lys Arg Tyr Gly Tyr Phe Cys Gly Lys
370 375 380

Tyr Val Ile His His Ser Asn Gly Cys Ile Val Tyr Pro Asp Pro Leu
385 390 395 400

Lys Leu Ile Ser Lys Leu Gly Asn Lys Ser Leu Glu Ser Tyr Asp His
405 410 415

Leu Glu Glu Phe Arg Ile Ser Leu Met Asp Val Ala Lys Pro Leu Phe
420 425 430

Asn Ala Ala Tyr Phe His Leu Leu Asp Asp Ala Ile His Glu Tyr Phe
435 440 445

Pro Ser Val Gly Gly Ser Ser Phe Ala Ile Asn Ser Leu Cys Lys Tyr
450 455 460

Leu Ser Asp Lys Trp Leu Phe Arg Ser Leu Phe
465 470 475

<210> 52
<211> 470
<212> PRT
<213> Tobamovirus/SHMV

<400> 52

Leu Gln Tyr Phe Tyr Asp Ser Trp Leu Pro Gly Asn Ser Phe Val Gln
1 5 10 15

NuCycle-0021.ST25.txt

Asn Asn His Asp Gln Trp Ser Ile Ile Ser Ser Asp Ile Asn Leu His
20 25 30

Ser Glu Ala Val Arg Leu Asp Met Asn Lys Arg His Ile Pro Arg Thr
35 40 45

Lys Gly Glu Phe Leu Arg Pro Leu Leu Asn Thr Ala Val Glu Pro Pro
50 55 60

Arg Ile Pro Gly Leu Leu Glu Asn Leu Leu Ala Leu Ile Lys Arg Asn
65 70 75 80

Phe Asn Ala Pro Asp Leu Ala Gly Gln Leu Asp Tyr Asp Phe Leu Ser
85 90 95

Arg Lys Val Cys Asp Gly Phe Phe Gly Lys Leu Leu Pro Pro Asp Val
100 105 110

Glu Ala Ser Glu Leu Leu Arg Leu Pro Val Asp His Met Tyr Ser Val
115 120 125

Gln Asn Phe Asp Asp Trp Leu Asn Lys Gln Glu Pro Gly Val Val Gly
130 135 140

Gln Leu Ala Asn Trp Asp His Ile Gly Met Pro Ala Ala Asp Gln Tyr
145 150 155 160

Arg His Met Ile Lys Arg Thr Pro Lys Ala Lys Leu Asp Leu Ser Ile
165 170 175

Gln Ser Glu Tyr Pro Ala Leu Gln Thr Ile Val Tyr His Ser Lys His
180 185 190

Val Asn Ala Val Phe Gly Pro Ile Phe Ser Cys Leu Thr Glu Arg Leu
195 200 205

Leu Ser Val Val Asp Pro Leu Arg Phe Lys Phe Phe Thr Arg Thr Thr
210 215 220

Pro Ala Asp Leu Glu Phe Phe Phe Arg Asp Met Val Val Gly Asp Met
225 230 235 240

Glu Ile Leu Glu Leu Asp Ile Ser Lys Tyr Asp Lys Ser Gln Asn Lys
245 250 255

Phe His Phe Glu Val Glu Met Arg Ile Trp Glu Met Leu Gly Ile Asp
260 265 270

NuCycle-0021.ST25.txt

Lys Tyr Ile Glu Lys Val Trp Glu Asn Gly His Arg Lys Thr His Leu
275 280 285

Arg Asp Tyr Thr Ala Gly Ile Lys Thr Val Ile Glu Tyr Gln Arg Lys
290 295 300

Ser Gly Asp Val Thr Thr Phe Ile Gly Asn Thr Ile Ile Ile Ala Ala
305 310 315 320

Cys Leu Cys Ser Ile Leu Pro Met Glu Lys Val Phe Lys Ala Gly Phe
325 330 335

Cys Gly Asp Asp Ser Ile Ile Tyr Leu Pro Arg Asn Leu Leu Tyr Pro
340 345 350

Asp Ile Gln Ser Val Ser Asn Asn Met Trp Asn Phe Glu Ala Lys Leu
355 360 365

Phe Lys Lys Leu His Gly Tyr Phe Cys Gly Arg Tyr Ile Leu Arg Asn
370 375 380

Gly Arg Tyr Leu Arg Leu Leu Pro Asp Pro Leu Lys Ile Ile Thr Lys
385 390 395 400

Leu Gly Cys Lys Ala Ile Lys Asp Trp Asp His Leu Glu Glu Phe Arg
405 410 415

Ile Ser Met Phe Asp Met Ala Cys Glu Tyr Lys Asn Cys Phe Gly Phe
420 425 430

Asp Val Leu Glu Ser Ala Val Lys Glu Ser Phe Pro Lys Ala Glu Gly
435 440 445

Cys Asn Val Ala Phe Cys Ala Ile Tyr Lys Phe Leu Ser Asn Lys Tyr
450 455 460

Leu Phe Arg Thr Leu Phe
465 470

<210> 53
<211> 458
<212> PRT
<213> Tobamovirus/POLIORDRP

<400> 53

Gly Glu Ile Gln Trp Met Arg Pro Ser Lys Glu Val Gly Tyr Pro Ile
1 5 10 15

NuCycle-0021.ST25.txt

Ile Asn Ala Pro Ser Lys Thr Lys Leu Glu Pro Ser Ala Phe His Tyr
20 25 30

Val Phe Glu Gly Val Lys Glu Pro Ala Val Leu Thr Lys Asn Asp Pro
35 40 45

Arg Leu Lys Thr Asn Phe Glu Glu Ala Ile Phe Ser Lys Tyr Val Gly
50 55 60

Asn Lys Ile Thr Glu Val Asp Glu His Met Lys Glu Ala Val Asp His
65 70 75 80

Tyr Ala Gly Gln Leu Met Ser Leu Asp Ile Asn Thr Glu Gln Met Cys
85 90 95

Leu Glu Asp Ala Met Tyr Gly Thr Asp Gly Leu Glu Ala Leu Asp Leu
100 105 110

Ser Thr Ser Ala Gly Tyr Pro Tyr Val Ala Met Gly Lys Lys Lys Arg
115 120 125

Asp Ile Leu Asn Lys Gln Thr Arg Asp Thr Lys Glu Met Gln Lys Leu
130 135 140

Leu Asp Thr Tyr Gly Ile Asn Leu Pro Leu Val Thr Tyr Val Lys Asp
145 150 155 160

Glu Leu Arg Ser Lys Thr Lys Val Glu Gln Gly Lys Ser Arg Leu Ile
165 170 175

Glu Ala Ser Ser Leu Asn Asp Ser Val Ala Met Arg Met Ala Phe Gly
180 185 190

Asn Leu Tyr Ala Ala Phe His Lys Asn Pro Gly Val Ile Thr Gly Ser
195 200 205

Ala Val Gly Cys Asp Pro Asp Leu Phe Trp Ser Lys Ile Pro Val Leu
210 215 220

Met Glu Glu Lys Leu Phe Ala Phe Asp Tyr Thr Gly Tyr Asp Ala Ser
225 230 235 240

Leu Ser Pro Ala Trp Phe Glu Ala Leu Glu Met Val Leu Glu Lys Ile
245 250 255

Gly Phe Gly Asp Arg Val Asp Tyr Ile Asp Tyr Leu Asn His Ser His
260 265 270

NuCycle-0021.ST25.txt

His Leu Tyr Lys Asn Lys Thr Tyr Cys Val Lys Gly Gly Met Pro Ser
 275 280 285
 Gly Cys Ser Gly Thr Ser Ile Phe Asn Ser Met Ile Asn Asn Leu Ile
 290 295 300
 Ile Arg Thr Leu Leu Leu Lys Thr Tyr Lys Gly Ile Asp Leu Asp His
 305 310 315 320
 Leu Lys Met Ile Ala Tyr Gly Asp Asp Val Ile Ala Ser Tyr Pro His
 325 330 335
 Glu Val Asp Ala Ser Leu Leu Ala Gln Ser Gly Lys Asp Tyr Gly Leu
 340 345 350
 Thr Met Thr Pro Ala Asp Lys Ser Ala Ile Phe Glu Thr Val Thr Trp
 355 360 365
 Glu Asn Val Thr Phe Leu Lys Arg Phe Phe Arg Ala Asp Glu Lys Tyr
 370 375 380
 Pro Phe Leu Ile His Pro Val Met Pro Met Lys Glu Ile His Glu Ser
 385 390 395 400
 Ile Arg Trp Thr Lys Asp Pro Arg Asn Thr Gln Asp His Val Arg Ser
 405 410 415
 Leu Cys Leu Leu Ala Trp His Asn Gly Glu Glu Glu Tyr Asn Lys Phe
 420 425 430
 Leu Ala Lys Ile Arg Ser Val Pro Ile Gly Arg Ala Leu Leu Leu Pro
 435 440 445
 Glu Tyr Ser Thr Leu Tyr Arg Arg Trp Leu
 450 455